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INSTRUCTION MANUAL

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Document Number:

Model Affected: 620-055-90

Description of Change: 251B-200

This uhnit is a single phase 250 VA power source with a 300VAC meter capable of operating at the 260 VAC range.

To addendum add output configuration schematic as shown.

A standard Model 251B can be modified by the following with appropriate wiring.

	ADD			DELETE		
1	857-300-82	0-300 VAC Meter		1	857-150-82	0-150VAC meter

Special Testing: Insure unit-has been modified correctly by checking wiring per instructions and schematic attached.

Elgar Corporation
8225 Mercury Court
San Diego, California
92111

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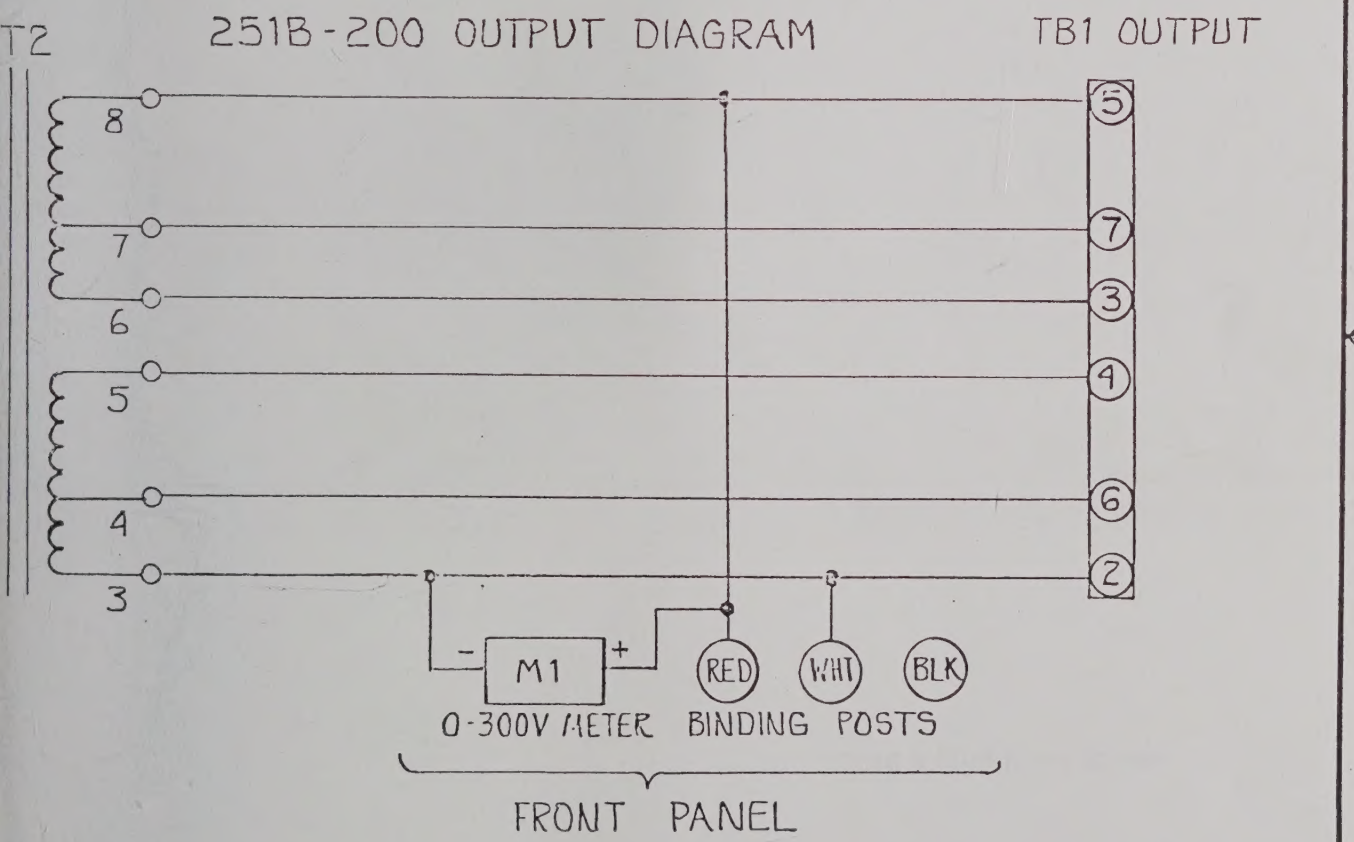
REVISIONS				
		DESCRIPTION	DATE	APPROVED
		SEE SHT 1		

WIRING CONT'D

WIRE #32 FM T2-8 TO TB1-5 REMOVE FROM T2-8 AND ATTACH TO T2-5 REMOVE FROM TB1-5 AND ATTACH TO TB1-4.



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251B & 501B Power Source

620-055-90/3-85/200

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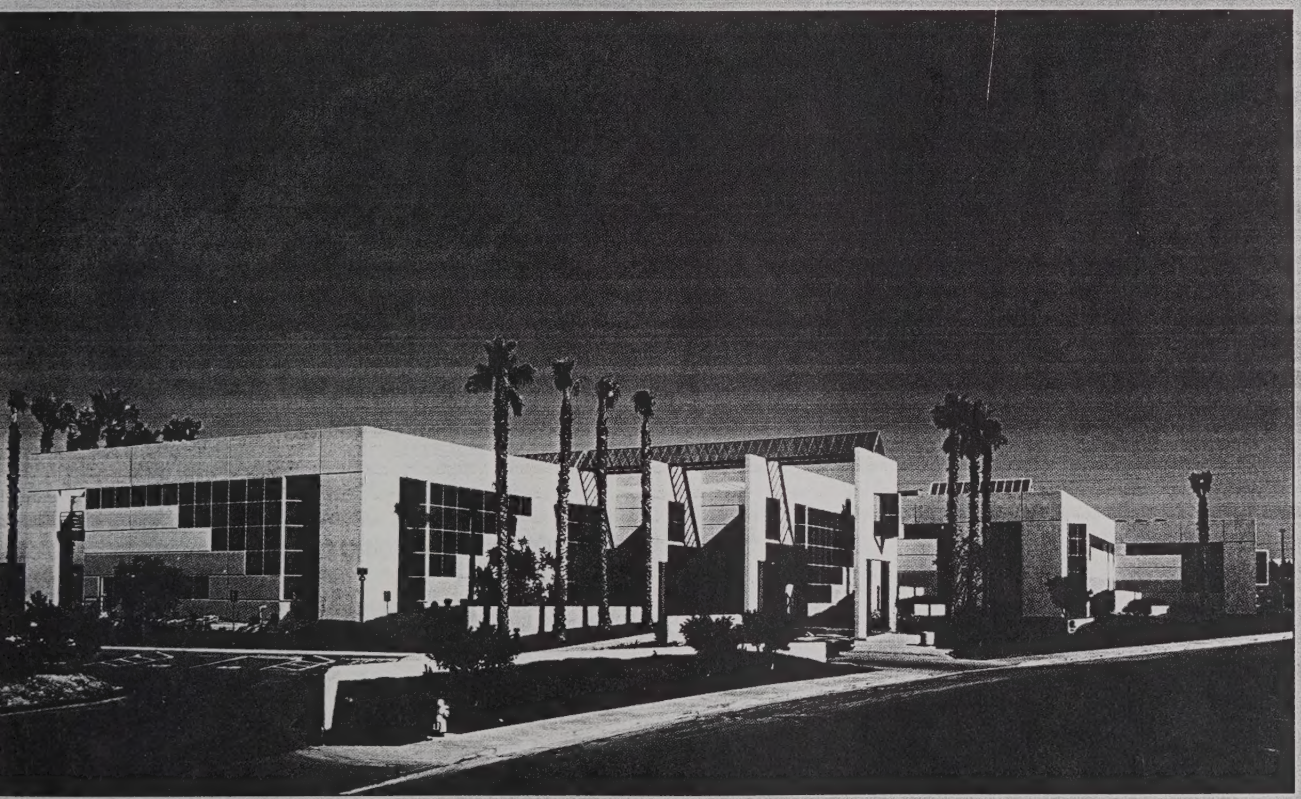

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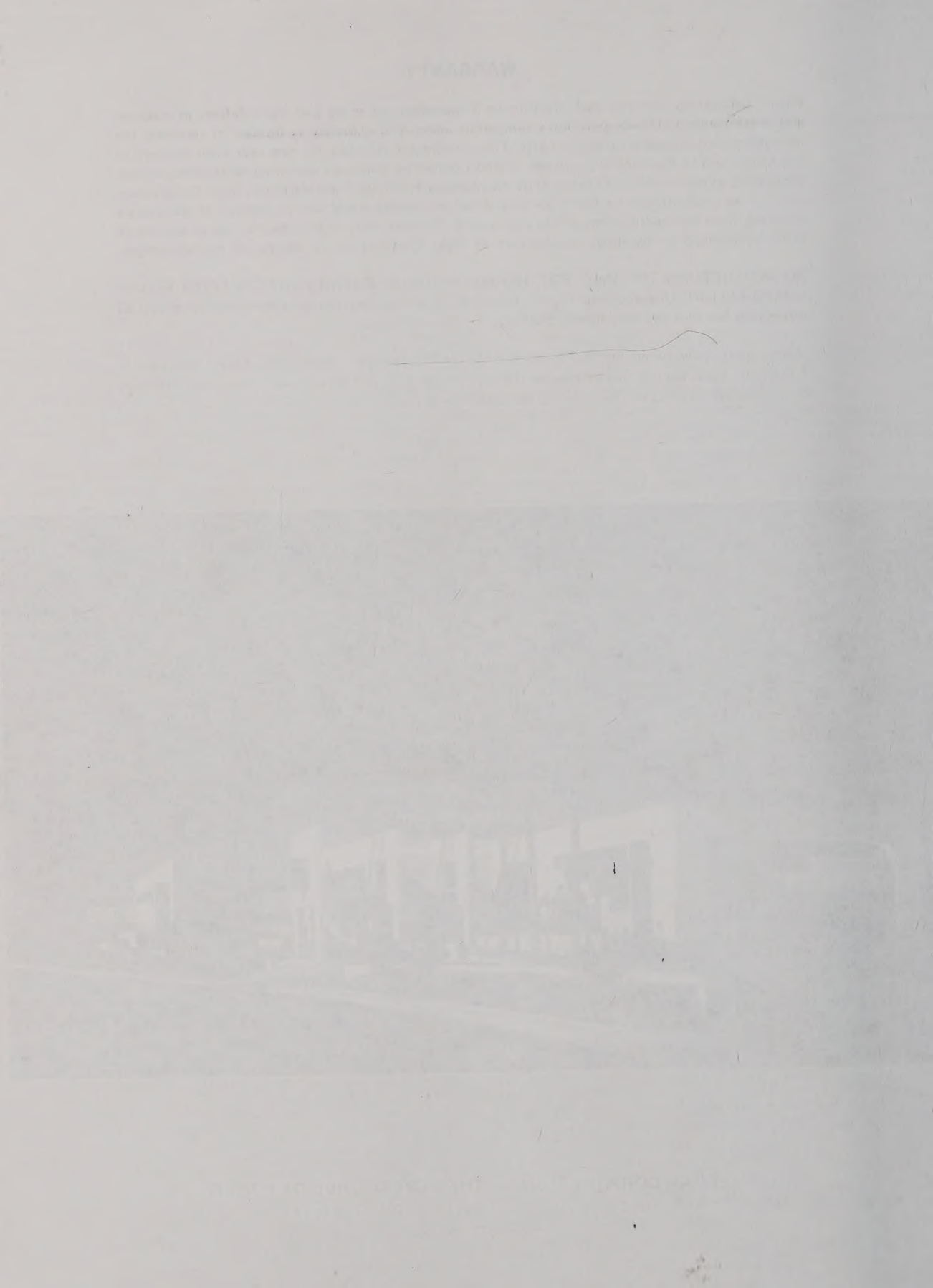

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SECTION I
GENERAL DESCRIPTION

1.1 INTRODUCTION

1.2 This manual has been prepared for use with the Elgar Model 251B and 501B Power Sources. The information it contains is intended for use by operators and trained technicians. The manual provides information regarding the installation, theory of operation and maintenance of the AC Power Source. Also included is a parts list and schematic diagrams to aid in maintaining the unit at optimum performance.

1.3 GENERAL DESCRIPTION

1.4 The Elgar Model 251B and 501B Power Sources provides AC power at precise frequencies for testing, motor operation, and frequency conversion.

1.5 The basic power amplifier consists of two DC power supplies and a direct- coupled amplifier driving a tapped output transformer. The output transformer of the Model 251B provides nominal output voltages of 28, 115, and 230 VAC, that are adjustable between 0-32, 0-130, and 0-260 VAC. The total available power for the Model 251B is 250VA at the rated output voltages. The output transformer of the Model 501B provides nominal output voltages of 60, 115 and 230 VAC, that are adjustable between 0-65, 0-130, and 0-260 VAC. The total available power for the Model 501B is 500VA at the rated output voltages.

1.6 Power at less than full-rated output voltage is derated as shown in Figure 1-1. Figure 1-2 shows a typical harmonic distortion curve over the frequency range of both units. The input power for both units is 115 or 230 VAC ±10%, 47-53Hz, 1Ø.

1.7 Output power frequency is established by a plug-in oscillator module. Output frequency range of the Model 251B at full power is 45 Hz to 5kHz and at rated half power is 5kHz to 10kHz. The output frequency range of the Model 501B at full power is 45 Hz to 5 kHz. A variety of fixed and variable frequency plug-in oscillator modules are available with frequency tolerances up to .0001%. (Refer to the specific oscillator manual.)

1.8 The basic power source output is single phase. Multi-phase power can be obtained, however, by stacking two or three power sources, all driven by a multi-phase plug-in oscillator module.

1.9 PHYSICAL DESCRIPTION

1.10 The Elgar Model 251B is contained in an all aluminum enclosure designed with a standard 19-inch rack-mounting and slide-out capability. Refer to paragraph 2-4, Section II for mounting instructions. The front panel of the Model 251B contains a voltmeter, a voltage amplitude control, a power circuit breaker and indicator light. The Elgar Model 501B is contained in an enclosure that consists of aluminum interior metal and a steel chassis. The front panel material is aluminum. This enclosure is also designed with a standard 19 inch rack mounting and slide out capability. The front panel of the Model 501B contains a voltmeter, a voltage amplitude control, a power circuit breaker and indicator light.

1.11 The wind tunnel contains the output power heatsink assemblies, which comprise a two-section power amplifier. The voltage amplifier and control circuitry is contained on a snap-in circuit board with test points and adjustment controls available at the top of the board. Output power of Model 251B is available for all output ranges at the output power terminal block located on the rear of the chassis. Output power of the Model 251B is also available at the red and white binding posts on the front panel for the 0-130 VAC range only. Output power for the Model 501B is available for all output ranges at the output power terminal block located on the rear of the chassis and the red and white binding posts on the front panel. The 0-65VAC range on the Model 501B requires internal jumpering on TB2 located inside the unit on the upper right side of the chassis. (Refer to schematic #6051001).

1.12 The Elgar Plug-In Oscillator module (supplied separately) mounts in the blank space located on the front panel of the power source. In most cases, however, the power source will already be equipped with this module depending on the original purchase order. If removal of the oscillator assembly is necessary, the two thumb screws will facilitate its removal or installation.

1.13 The grill openings located on the front panel and rear panel provide the fan with the necessary air intake and outlet locations for proper operation. The air is drawn into the front grill and exhausted through the rear grill.

CAUTION

Under no circumstances should the front or rear grill openings be blocked or serious damage to the power source may occur.

1.14 PERFORMANCE SPECIFICATIONS

1.15 The performance specifications for the Model 251B and Model 501B appear in Table 1-1. A graph illustrating output power derating appears in Figure 1-1, while still another graph illustrating the typical harmonic distortion of the power sources at rated power appears in Figure 1-2.

1.16 SYSTEM APPLICATIONS

1.17 The Model 251B and 501B can be connected in two's or three's with a common oscillator to provide double power, single-phase, two-phase and three-phase power. The various standard system model numbers available are as follows:

1-18 Model 251B Systems

1. System 500-1
   This system consists of (2) Model 251B's, (1) Model 400BT Signal-Routing Plug-In and (1) interconnecting cable. Not included with the system but necessary to complete it, is (1) 400(T) plug-in oscillator. This system provides 500VA single phase, output power, at 65VAC, 130VAC, or 260VAC output voltage.

2. System 500-2
   This system consists of (2) Model 251B's (1) 400B Signal-Routing Plug-In, and (1) interconnecting cable. Not included with the system, but necessary to complete it, is (1) Elgar 2-phase plug-in oscillator. This system provides 250VA output power per phase at 32VAC, 130VAC or 260VAC output voltage.

3. System 500-3D
   This system consists of (2) Model 251B's (1) Model 400B Signal-Routing Plug-In, and (1) interconnecting cable. Not included with the system but necessary to complete it, is (1) Elgar 3-phase plug-in oscillator. This system is connected in a 3-phase, open-delta configuration. The output power per phase is 166 VA at 32 VAC, 130VAC or 260VAC output voltage.

4. System 500-3Y
   This system consists of (2) Model 251B's (1) Model 400B Signal-Routing Plug-In, and (1) interconnecting cable. Not provided with the system, but necessary to complete it is (2) Elgar 3-phase plug-in oscillator. This system is connected in a 3-phase, phantom-wye configuration. The output power per phase is 166VA at 32VAC,130VAC or 260VAC output voltage.

5. System 750-3
   This system consists of (3) Model 251B's (1) Model 400B, (1) Model 400C, and (1) interconnecting cable. Not provided with the system, but necessary to complete it is (1) Elgar 3-phase plug-in oscillator. This system is connected in a three amplifier, 3-phase, wye configuration. The output power is 250VA per phase at 32VAC, 130VAC or 260VAC output voltage.

1-19 Model 501B Systems

1. System 1000-1
   This system consists of (2) Model 501B's (1) Model 400BT Signal-Routing Plug in, and (1) interconnecting cable. Not included with the system, but necessary to complete it, is (1) 400(T) plug-in oscillator. This system requires the two power sources be connected in tandem thus providing 1000VA (1KVA) single-phase output power at 130VAC or 260 VAC output voltage.

2. System 1000-2
   This system consists of (2) Model 501B's (1) Model 400V, and (1) interconnecting cable. Not included with the system, but necessary to complete it, is (1) Elgar 2-phase plug-in oscillator. This system provides 500 VA power output per phase at 65 VAC, 130 VAC or 260 VAC output voltage.

3. System 1000-3D
This system consists of (2) Model 501B's (1) Model 400V, and (1) interconnecting cable. Not included with the system, but necessary to complete it, is (1) Elgar 3-phase plug-in oscillator. This system is connected in a 3-phase open-delta configuration. The output power per phase is 333 VA at 65 VAC, 130 VAC or 260 VAC output voltages.

4. System 1000-3Y
This system consists of (2) Model 501B's, (1) Model 400V Signal-Routing Plug-In, and (1) interconnecting cable. Not included, but necessary to complete the system, is (1) Elgar 3-phase plug-in oscillator. The system is connected in a 3-phase, phantom-wye configuration and has 333 VA power output per phase at 65VAC, 130VAC or 260VAC output voltage.

5. System 1500-3
This system consists of (#) Model 501B's, (1) Model 400V, (1) Model 400C, and (1) interconnecting cable. Not included with the system, but necessary to complete it is (1) Elgar 3-phase plug-in oscillator. The system is connected in a three-amplifier 3-phase wye configuration. The output power pwer phase is 500 VA at output voltages of 65VAC, 130VAC or 260VAC output voltage.

1.20 Whenever a standard Elgar System has been ordered with a cabinet, the system model number will be preceded with the letter C. Information concerning the output connections of any of the standard systems appears in Section II of this instruction manual. Information concerning calibration of System 500-1 appears in Section V.

Table 1-1. Performance Specifications

	MODEL 251B	MODEL 501B
OUTPUT		
Power: (VA)	250	500
Power Factor @ Full VA	±0.7	±0.7
Voltage Ranges (VRMS)	0-32,0-130,0-260	0-65,00-130,0-260
Frequency Range (Hz)	45-10000	45-5000
Distortion % @ Full Load -		
45-200 Hz	0.6	0.6
200-1000 Hz	0.4	0.4
1000-5000 Hz	0.6	0.6
5000-10000 Hz	0.9	---
INPUT		
Voltage (VAC)	115 or 230	115 or 230
Phase	Single	Single
Frequency (Hz)	47-63	47-63
Power (approx.max.W.)	800	1700
PHYSICAL		
Height (in & mm)	5.25 133	7.00 178
Width (in & mm)	19 482	19.00 482
Depth (in & mm)	16 406	19.00 482
Weight, net (lbs. kg.)	55 25	90 41
shipping (lbs. kg.)	65 29	105 47

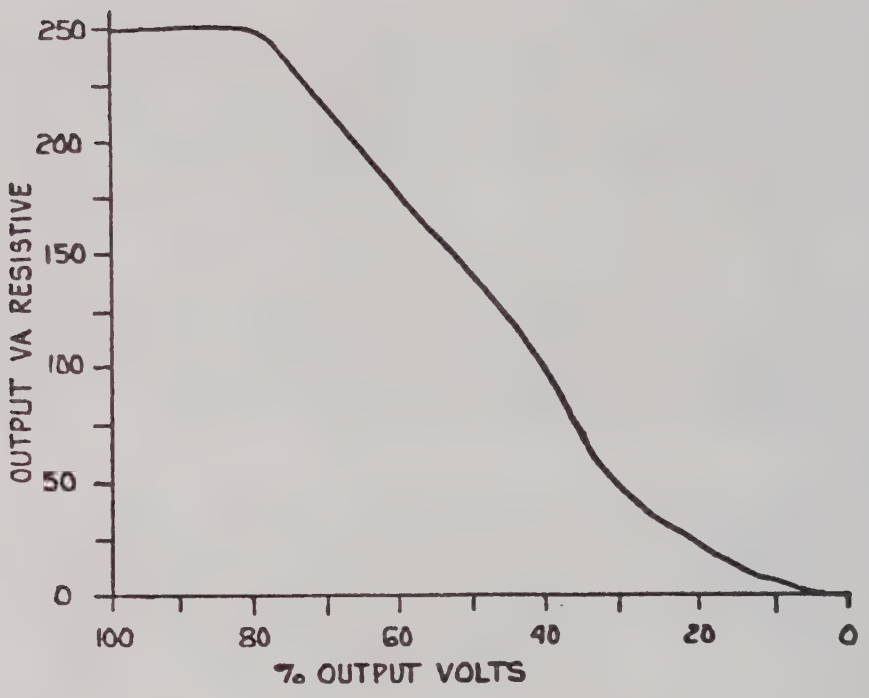


Figure 1-1. Power Output Derating

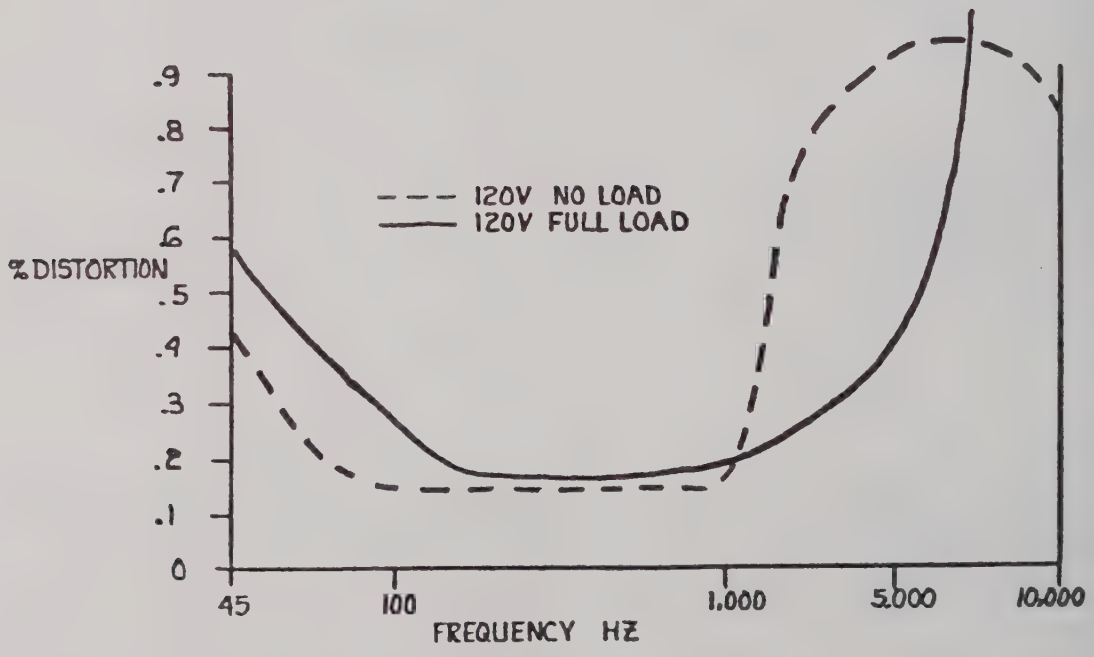


Figure 1-2. Typical Harmonic Distortion at Rated Power

SECTION II
INSTALLATION

2.1 INTRODUCTION

2.2 The Model 251B and Model 501B Power Source have been calibrated and quality tested prior to shipment. The unit is, therefore, ready for installation and operation upon receipt. Instructions in this section must be followed to ensure proper inspection upon receipt of the unit and to ensure correct installation.

2.3 UNPACKING AND RECEIVING INSPECTION

2.4 The unit has been packed in accordance with industrial standards for safe shipment. Upon receipt of the unit, unpack and inspect the unit as described in the following steps:

1. Visually inspect the unit exterior for any signs of damage, such as dents, scratches, or distortion.

2. Check the front panel controls for ease of operation.

3. Ensure that the front panel indicators are not damaged.

4. Inspect the front panel mounted meters and ensure they are not damaged.

5. Remove the top cover and ensure the circuit board is securely seated on its standoffs and that the five connectors going to it are also securely seated. Re-install top cover.

6. If the power source has been equipped with a plug-in module, remove and inspect it for any signs of damage. Reinstall the plug-in module. Removal and reinstallation of the plug-in module is facilitated by the use of two thumb-screws located on the front of the plug-in module. Insure plug-in module mates securely to the amplifier board.

NOTE

If obvious damage is evident, both the shipping agency and Elgar Corporation should be notified immediately. It is important to save all shipping material for inspection.

To notify Elgar Corporation, send a damage report to Elgar Service Department, 9250 Brown Deer Rd., San Diego, California 92121. Elgar Corporation, in return, will provide instructions for repair or replacement of the damaged unit. Under no circumstances should the unit be returned without the approval of the Elgar Corporation.

2.5 RACK MOUNTING

2.6 Both power sources have been designed to allow rack mounting in a standard 19-inch instrument rack. The physical dimensions of the units are given in Table 1-1 of Section 1.

2.7 For slide-out capability, the power sources have been built with threaded screw holes on both sides of the unit to allow for installation of the Zero Mfgs. Co. chassis slides, part number CTN-120.

CAUTION

When mounting the Model 251B or Model 501B, ensure that the flow of air into the fan intake or outlet is not obstructed or serious damage may occur to the unit.

2.8 INSTALLATION

2.9 Power Requirements

2.10 This AC Power Source operates from either 115VAC or 230VAC, single phase, 47 Hz to 63 Hz input power. The maximum input power (approximately) of the Model 251B at worst case is 1000 watts. The maximum input power (approximately) of the Model 501B at worst case is 1700 watts.

2.11 Unless specified, the Model 251B and 501B will be wired for 115 VAC input voltage operation. For 230 VAC operation, remove jumper wire from pin 3 and pin 4 of TB2. Locate wire connecting TB2 pin 1 to input transformer T1 pin 2. Disconnect at TB2 pin 1 and reattach to TB2 pin 4. (Refer to Fig. 7-1 and Fig. 7-2, Schematics in Section VII.)

2.12 Plug-In Modules

2.13 In most cases, the Model 251B and Model 501B will already have a plug-in oscillator, signal-routing plug-in or a blank panel installed. However, in the event installation of one of these plug-in modules is necessary, the two thumb screws will facilitate their installation or removal.

2.14 External Oscillators, Programming and Synchronization

2.15 In some applications it may be desirable to use an external oscillator rather than an Elgar plug-in module. If this situation exists, the blank space in the front panel should contain a blank filler panel (supplied separately).

2.16 When using an external oscillator, all input and control signals should be connected to J1, a 12-pin Cinch-Jones connector. J1 is located on the rear panels of the Model 251B and Model 501B. (Refer to Figure 2-1.) Connector J1 may also be used for external amplitude programming and synchronization of the internal Elgar plug-in oscillator to an external timing source. It is important to know that when an external oscillator is used, the input impedance must be matched to the input operational amplifier to obtain a gain of 1.

2.17 CHECKOUT

2.18 The Model 251B and 501B may be checked out as follows:

1. Inspect the plug-in oscillator.

2. Connect the load to the appropriate terminal of the rear panel power output terminal block (See Figures 2-1 and 2-2). For bench-mounted applications, the front panel binding posts may be used for 130V output only on the Model 251B. The front panel binding posts may be used for 130V or 260V output on the Model 501B.

3. Connect the input power cord on the rear panel to an appropriate source of single-phase power.

4. Set the front panel power switch to the ON position. The indicator lamp that lights indicates power has been applied to the unit.

5. Adjust front panel AMPLITUDE control for the desired output voltage as indicated on the front panel voltmeter.

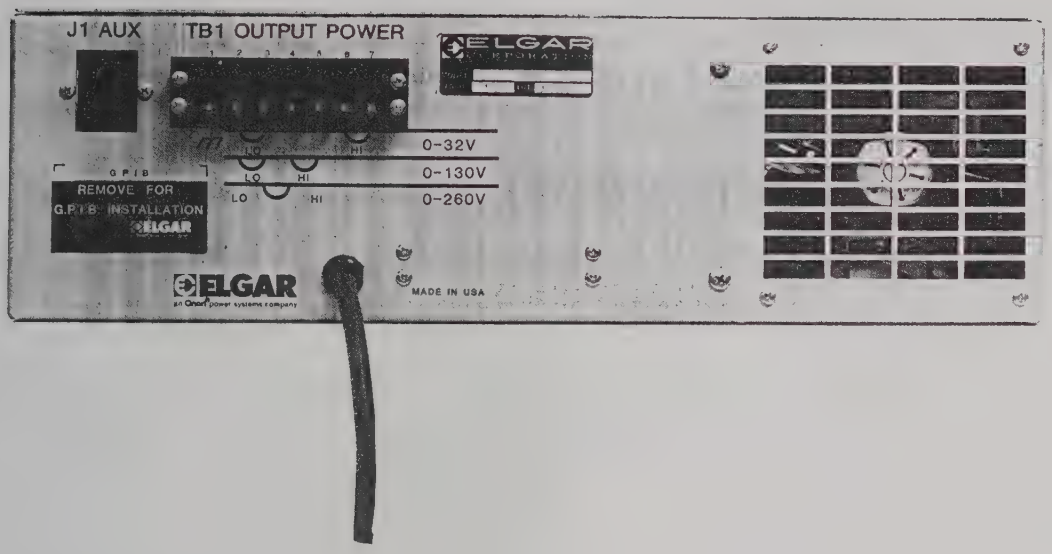


Figure 2-1. Model 251B Rear View.

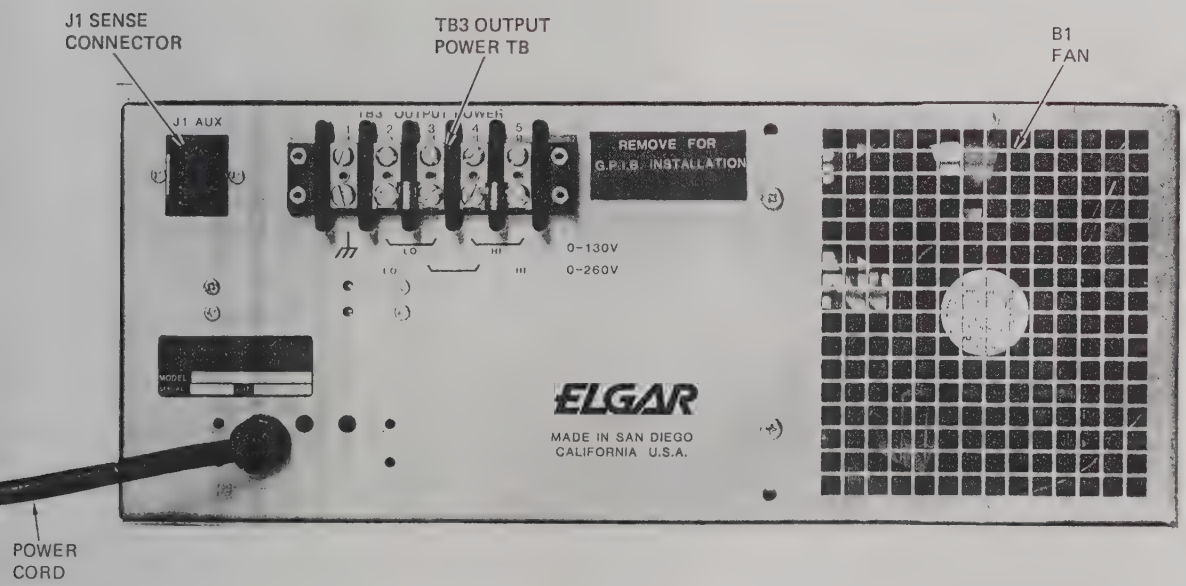


Figure 2-2. Model 501B Rear View

SECTION III
OPERATION

3.1 INTRODUCTION

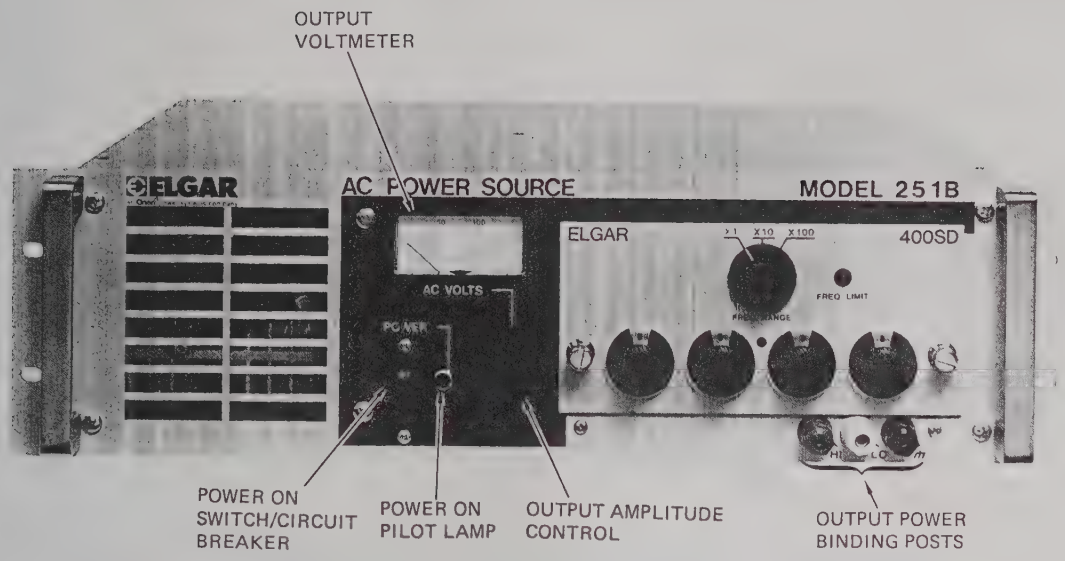
3.2 This section describes the controls and indicators of the Model 251B and 501B. The controls and indicators are called out in Figures 3-1 and 3-2. The functions of the controls and indicators are given in Table 3-1. (Refer to Oscillator Instruction Manual for a description of the controls on the oscillator plug-in module.)

3.3 CONTROLS AND INDICATORS

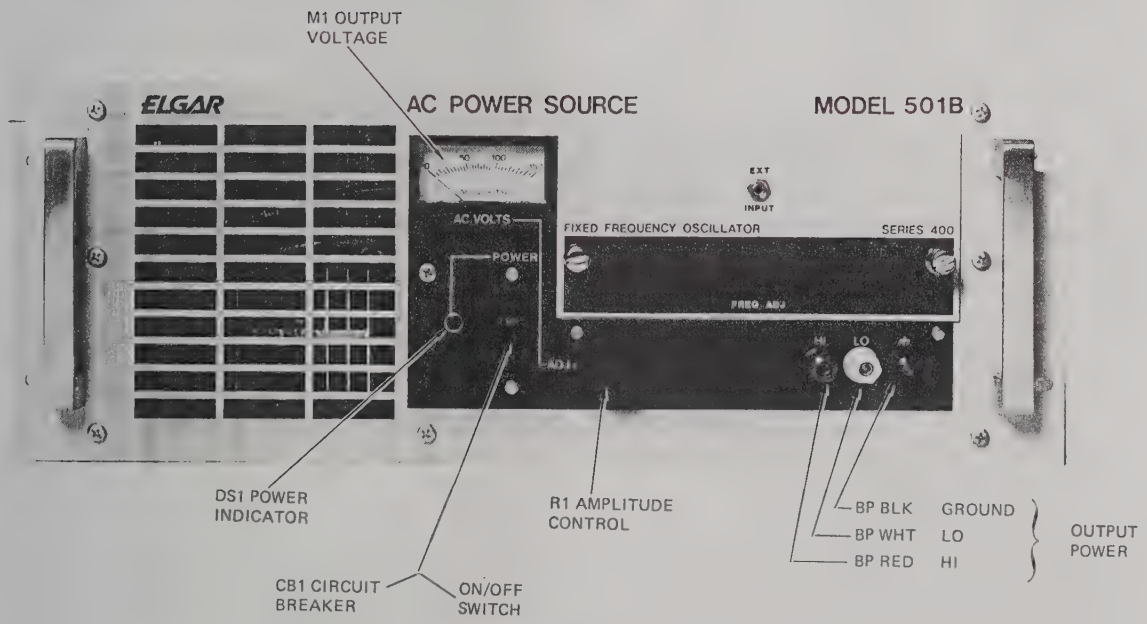
3.4 The controls and indicators of Model 251B and 501B is described in Table 3-1.

TABLE 3-1. CONTROLS AND INDICATORS

Control and Indicator	Function
Input Power Circuit Breaker CB1	Applies AC input power to unit.
Indicator Lamp DS1	Lights to indicate power has been applied to unit.
AC Voltmeter M1	Monitors output voltage 0-150
AMPLITUDE Control Potentiometer R1	Adjust input signal amplitude of oscillator.



Model 251B



Model 501B

Figure 3-1. Front View

SECTION IV
THEORY OF OPERATION

4.1 CIRCUIT DESCRIPTION (Refer to Figures 4-1, 7-1, and 7-2)

4.2 The input signal, approximately 3VRMS, is provided by the plug-in oscillator. For most oscillators, the input signal amplitude is controlled by front panel AMPLITUDE control. The signal is applied to the first amplifier stage of differential amplifier Q1. The differential amplifier provides high DC stability. The emitter currents are supplied by R2 from a +12V supply regulated by CR1. The output of Q1 is coupled to the base of Q2 which provides drive signals to the complementary driver stage, Q6 and Q5. Q5 operates as an emitter-follower to drive emitter-follower Q1 of upper heatsink assembly, which provides base drive signals to the upper half of the push-pull class B power amplifier. Q6 is operated as a common emitter stage to provide phase inversion of the drive signals to the lower half of the power amplifier. The output of Q7 is applied to emitter-follower Q2 of the lower heatsink assembly which provides base drive signals to the lower half of the power amplifier.

4.3 The power amplifier consists of a number of power transistors mounted on two heatsinks. The .22 ohm emitter resistors ensure equal current sharing of the output transistors. The driver and output stages are operated from nominal ±42VDC supplies. Thermal switch S1 shown on heatsink No. 1 turns drive signals off to the power amplifier in the event the power amplifier overheats from excessive load or restricted airflow through the wind tunnel.

4.4 The power amplifier is also protected from overloads or short circuits on the output by current limit transistors Q3 and Q4. The current in the upper half of the power amplifier is sampled by R2 and applied across upper limit adjustment potentiometer R25. The current signal is then applied to the base of Q3 through R18. When the voltage at the base of Q3 reaches Q3's conduction threshold (approximately 0.6V) the drive signal is diverted from the base of Q5, preventing any further increase in output current. Simultaneously, the current in the lower half of the power amplifier is sampled across R32 and applied across lower limit adjustment potentiometer R4. This signal is then applied to the base of Q4 through R22. When the voltage at the base of Q4 reaches Q4's conduction threshold, the drive signal is diverted from the base of Q6 preventing a further increase in output current.

4.5 Amplifier output (TP2) is connected to output transformer T2, which steps up the amplifier voltage to the required output level. Negative AC feedback path is from TP2 through R15 to a base of Q1. Capacitor C7 across R15 is used to prevent high-frequency oscillations in output. Load regulation is accomplished by passing the TP2 wire from the heatsink plug through a current

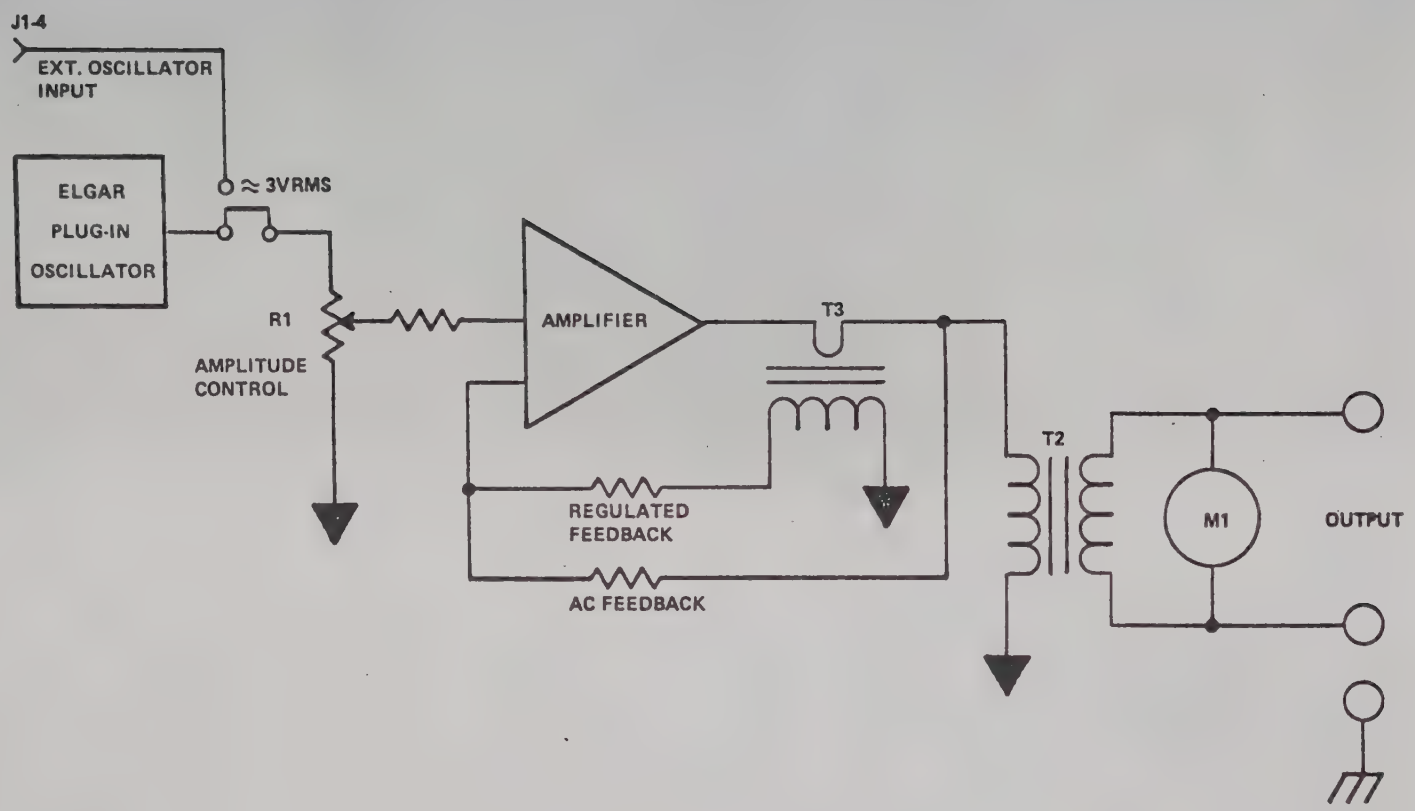


Figure 4-1. Model 251B and 501B Block Diagram

transformer T3. Positive current feedback is taken across the secondary through regulation adjustment potentiometer R7 and to the base of Q1 through R8. R7 and C5 are used as a high-frequency regulation boost network.

4.6 POWER SUPPLIES

4.7 Plus and minus 42VDC for the amplifier is developed by the full-wave bridge rectifier on the secondary T1. Filter capacitors and supply bleeder resistors R28 and R29 located on the amplifier board are connected across the output of the bridge.

4.8 INTERCONNECTIONS FOR MULTI-PHASE OPERATION

4.9 Two or three Power Sources may be used to generate two-phase or three-phase AC power. Two-phase or three-phase signals are generated in a two-phase or three-phase oscillator installed in the master power amplifier. Signals from the oscillator are carried to one or two slave power amplifiers (see Figure 4-2), each of which has a blank signal routing plug-in which makes the required signal interconnections to the power amplifier. The front panel AMPLITUDE control on the master amplifier controls the amplitude of all the amplifiers outputs simultaneously. Upon initial installation of the system, the A phase power amplifier should be turned on first and the output voltage adjusted to the desired level. Next energize the B phase unit and set its output voltage to equal the A phase unit. When applicable, repeat for C phase power amplifier. Some minor adjustments to the A,B, and C phase units will be necessary to initially calibrate the system.

4.10 Two-phase operation requires two power sources. Three-phase operation may be accomplished with three power sources in wye connection, or with two power sources in open-delta connection. A more detailed description of two-phase and three-phase power generation is provided in the oscillator instruction manual.

4.11 In the open-delta configuration, two power amplifiers of equal VA rating are driven by a standard three-phase oscillator having 120° phase angle between ØA, ØB and ØC. An open delta requires that the two amplifiers have a 60° phase angle between them and this is accomplished by inverting the second amplifier.

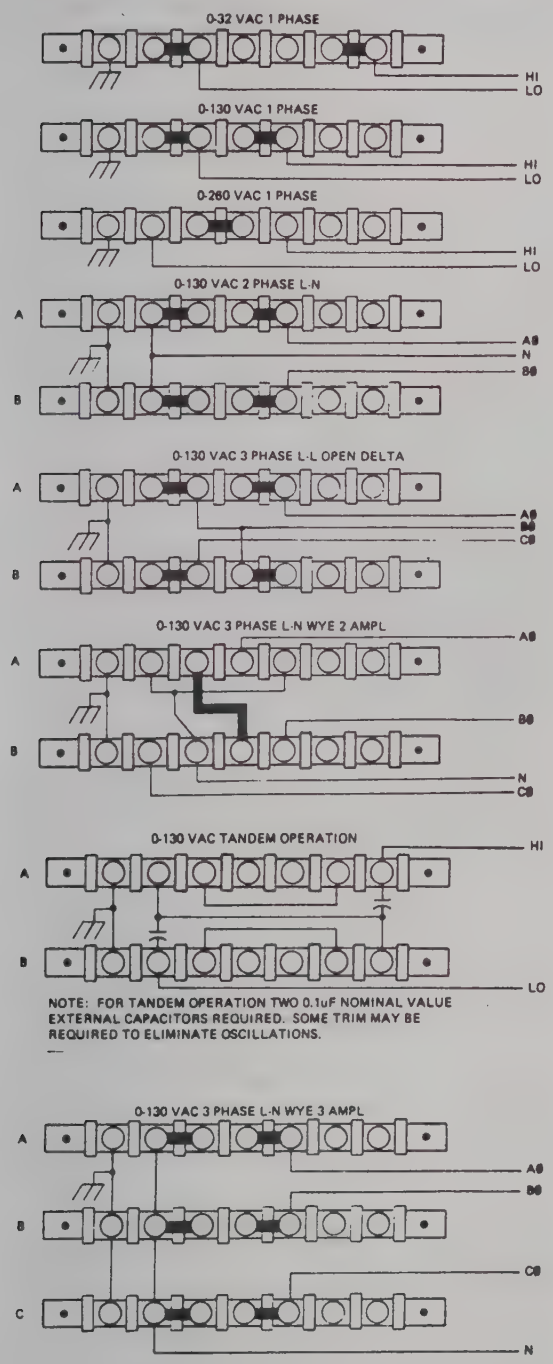
4.12 In these systems, the amplifier containing the plug-in oscillator is referred to as the master or A-phase source. The second amplifier is referred to as the slave or B-phase source.

4.13 The open delta hook-up shown in Figure 4-2 is shown as a vector diagram in Figure 4-3.

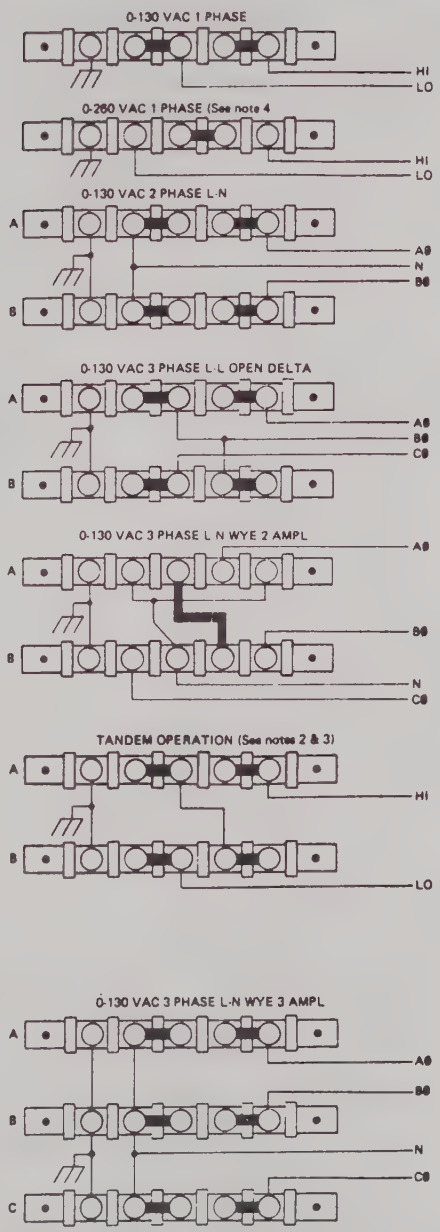
4.14 Certain specialized oscillators such as the Super Stable (SS) series and the Quasi-Square wave series are designed only for open-delta configurations using two amplifiers and having the phase angle between the ØA and ØB drive signals at 60°.

4.15 When using the SS series or quasi-square wave systems the interconnections would be as shown in Figure 4-4.

MODEL 251B OUTPUT CONFIGURATIONS



MODEL 501B OUTPUT CONFIGURATIONS



NOTES:
1. For 0-65 VAC 1 Phase, internal jumpers for output transformer must be changed. Refer to 501B schematic. External connections same as 0-130 VAC 1 Phase output.
2. For 0-130 VAC tandem operation, internal jumpers for output transformer must be changed. Refer to 501B schematic.
3. For 0-260 VAC tandem operation, use standard internal connections.
4. The 0-260 VAC 1 Phase connection can be used for interconnection between units for all shown except 2 ampl wye.

Figure 4-2. Output Configurations

4.16 The 400 SR plug-in is a universal signal routing plug-in used in multi-phase systems to route drive signal from a master plug-in oscillator or an external

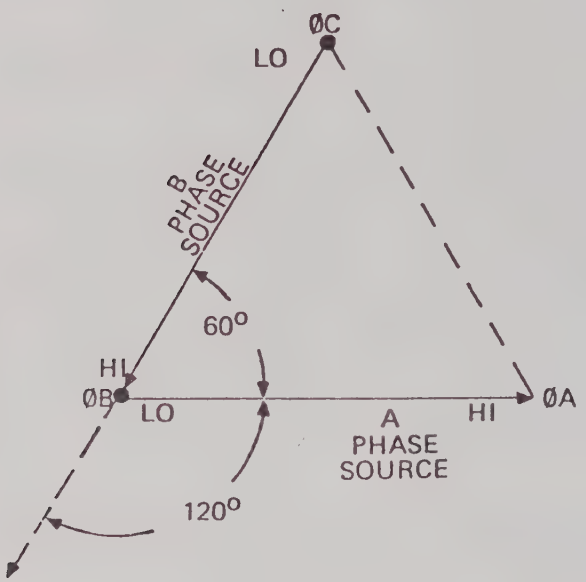


Figure 4-3.

oscillator source. The routing is accomplished by the closing of specific switches on the 8 pole single throw DIP Switch. Standard plug-ins are as follows (for special configurations refer to the addendum):

Model 400A External oscillator adaptor. Has front panel phone jack and routes signal to power amplifier input. DIP Switch not necessary. If present switches 7 & 8 must be ON connecting pins 14 to 21 and 16 to 12.

Model 400B Blank plug-in used in 2nd amplifier (B phase) of multi-phase system. Routes appropriate signal from oscillator in 1st amplifier input switches 6 7 8 must be ON connecting pins 22 to 11, 21 to 14, 16 to 12.

Model 400C Blank plug-in used in 3rd amplifier (C phase) of 3 amplifier, 3 phase system. Routes appropriate signal from oscillator in 1st amplifier to 3rd amplifier input. Switches 5 7 8 must be ON, connecting pins 22-10,21-14, 16 to 12.

400BT Blank plug-in used in 2nd amplifier(s) in a Tandem System such as 2000-1. Also used in single phase TG 704A systems or in phase A of multi-phase TG 704A-3 systems. Switches 4, 7, 8, must be ON connecting pins 22, 9, 21 to 14 and 16 to 12.

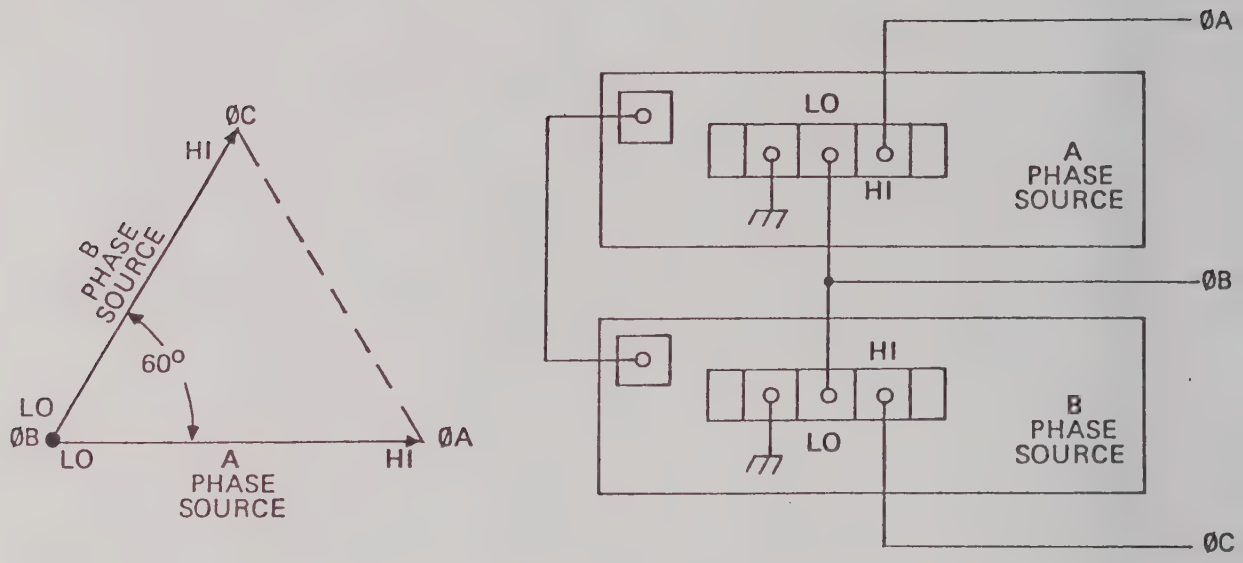
400-DPA Blank plug-in used in single phase DAP systems or in phase A of multi-phase DAP systems. Switch 4 8 must be ON connecting pins 14 to 9 and 16 to 12.

400-DPB Blank plug-in used in Phase B of multi-phase DAP systems. Switches 1 8 must be ON connecting pins 14 to 11 and 16 to 12.

400-DPC Blank plug-in used in phase C of multi-phase DAP systems. Switches 2 8 must be ON connecting pins 14 to 10 and 16 to 12.

400-TGB Plug in used in single package 30 units such as 1753B when used with TG 704A-3. It has front panel B and C phase amplitude pots. Switches 4 7 8 must be ON connecting pins 22 to 9, 21 to 14 and 16 to 12.

QUASI-SQUARE WAVE SUCH AS 443-1-111



SUPER STABLE SUCH AS 443-.01SS

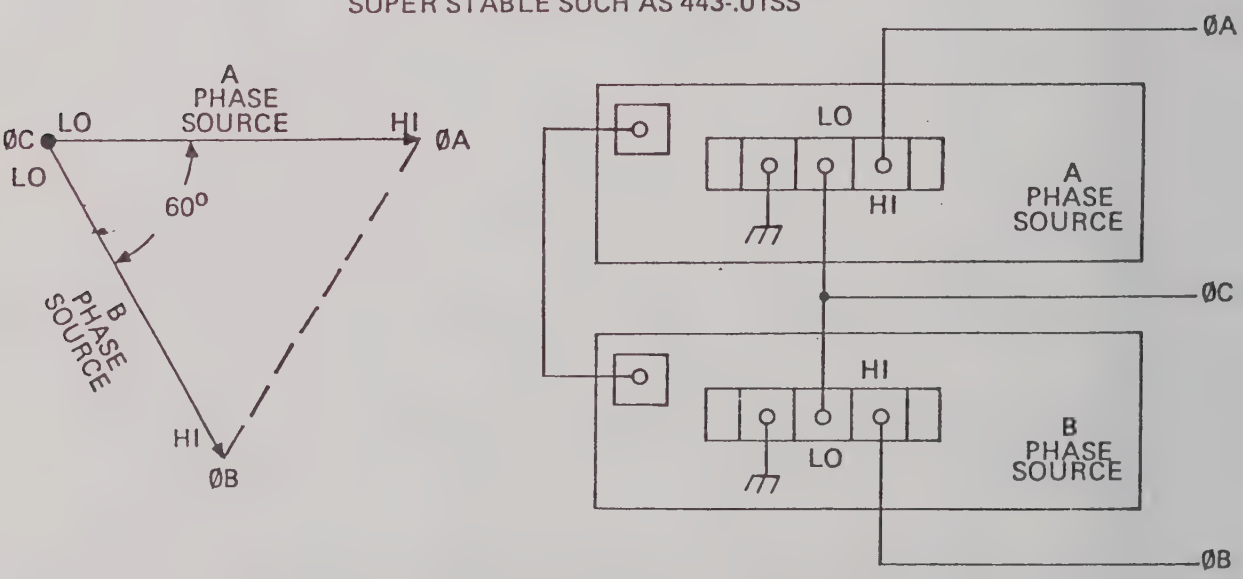


Figure 4-4

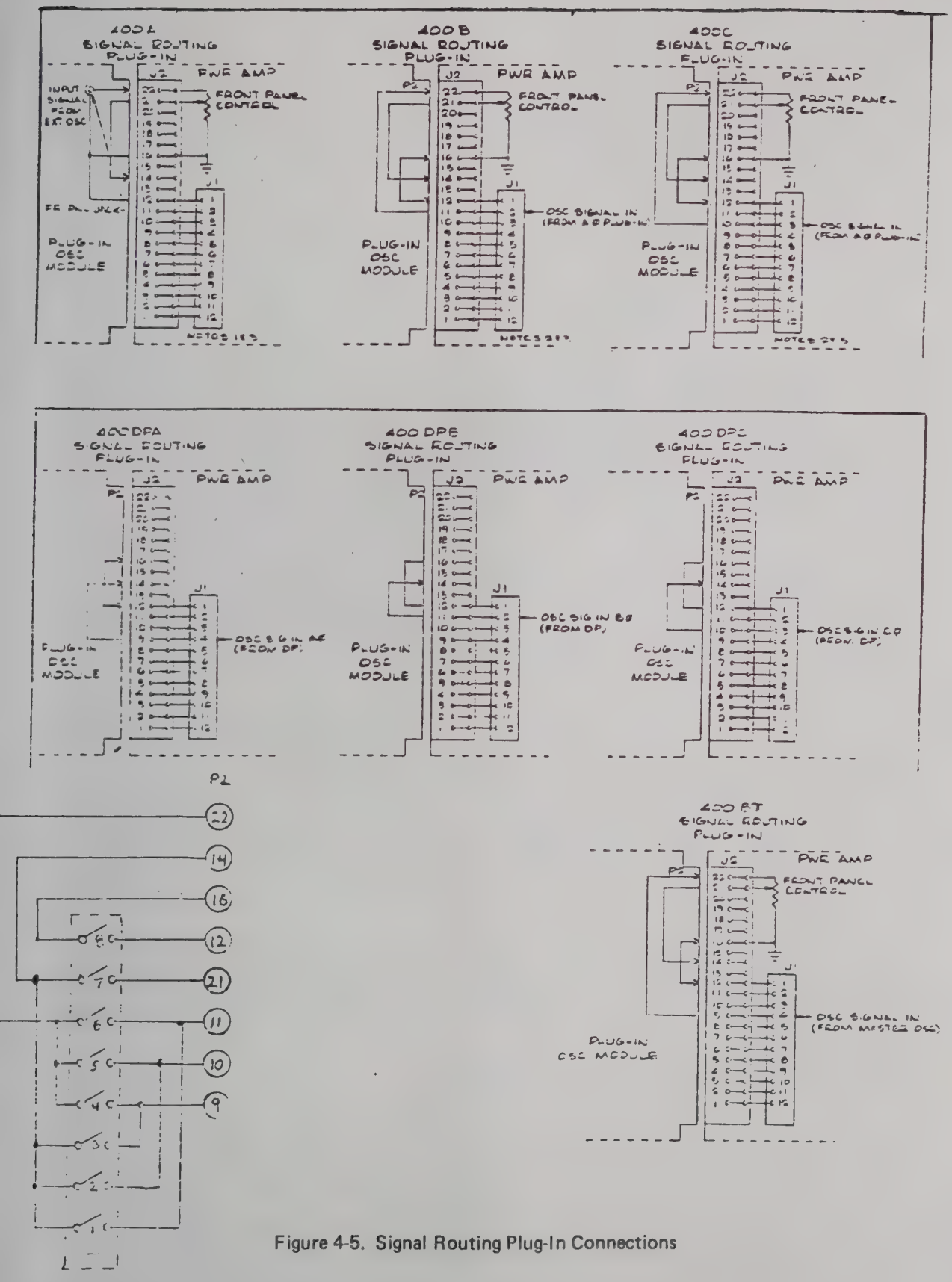


Figure 4-5. Signal Routing Plug-In Connections

SECTION V
MAINTENANCE

5.1 INTRODUCTION

5.2 This section provides maintenance information of a general nature. Specific questions concerning the operation, repair or servicing of the unit should be directed to the nearest Elgar representative or to the Service Department, Elgar Corporation, 9250 Brown Deer Rd., San Diego, California 92121. Include the model number and serial number in any correspondence concerning the unit.

5.3 FACTORY REPAIR

5.4 Should it be necessary to return a unit to the factory for repair, please contact the Elgar Corporation Service Department for authorization to make shipment. DO NOT RETURN THE UNIT WITHOUT AUTHORIZATION.

5.5 TEST POINTS

5.6 Test points and adjustment controls are conveniently provided at the top of the amplifier circuit board, accessible by removing the top cover of the unit (see Figures 5-1 and 5-2). The test points are as follows:

TP1	-	Circuit common	-	turret terminal
TP2	-	Amplifier output	-	turret terminal
TP3	-	Oscillator signal	-	turret terminal

5.7 OUTPUT REGULATION ADJUSTMENT

5.8 The regulation adjustment, R9 is set at the factory to give ±1% load regulation over the full frequency range of the power source. The regulation may require re-adjustment if the load is highly reactive or if zero regulation is desired for a specific load and frequency. To make this adjustment, disconnect the load and read the output voltage. Connect the load and adjust R9 until the same reading is obtained.

NOTE

If the load is heavy enough to cause current limit transistors Q3 and Q4 to conduct, the output voltage will be reduced, giving an indication of poor load regulation. Load voltage fall-off due to current limiting action should not be compensated by the regulation adjustment.

5.9 CURRENT LIMIT ADJUSTMENT

5.10 The current limits have been preset at the factory such that the unit will deliver full rated power at rated output voltage. Re-adjustment of the limits should not be performed unless a malfunction has occurred in the unit, parts have been replaced and re-adjustment of the limits is indicated.

5.11 Current limit adjustment may be checked by observing the waveform at TP2 with an oscilloscope.

1. Set scope sensitivity to 10 v/cm.
2. Turn unit on and adjust output for 110 VAC as indicated on the front panel meter.
3. Connect 46 ohm load to output terminals of 251B or connect 23 OHM load to output terminal of 501B.
4. Adjust current limit potentiometers CW until clipping is observed at TP2. Adjust limit potentiometers CCW until clipping just disappears.

5.12 PERIODIC MAINTENANCE

5.13 The only periodic maintenance required by the power source is an occasional cleaning of the heatsinks. The heatsinks may be inspected through the front panel air grill. If enough dust and dirt have accumulated to restrict the air flow, an air jet should be directed through the front panel grill while the unit is operation. If this does not dislodge the dirt, the heatsink must be removed to be cleaned.

5.14 TROUBLESHOOTING

5.15 CIRCUIT BREAKER TRIPS. If the circuit breaker trips at no load, a fault in either the power transistors or power rectifiers is indicated. Unplug all leads to both heatsinks and try the circuit breaker. If it does not trip, look for a shorted power transistor (power transistors can be tested with an ohmmeter). If the circuit breaker still trips, look for a shorted rectifier bridge. If all diodes and filter capacitors are good, a fault in the power transformer or wiring harness is indicated.

5.16 OUTPUT DISTORTION. Output distortion may be caused by overloading. Check the load current waveform with an oscilloscope since some high crest factor loads may draw considerably more peak current than is indicated by a load ammeter.

5.17 OVERHEATING. If overheating causes thermostat S1 to close, the output voltage will fall to zero. Overheating may be caused by restricted air flow or excessive environmental temperature (greater than 50°C).

5.18 COMPONENT LOCATIONS. Refer to Figures 5-1 through 5-3 for major component locations in Models 251B and 501B. Also, refer to Section VII for parts layouts of board assemblies.

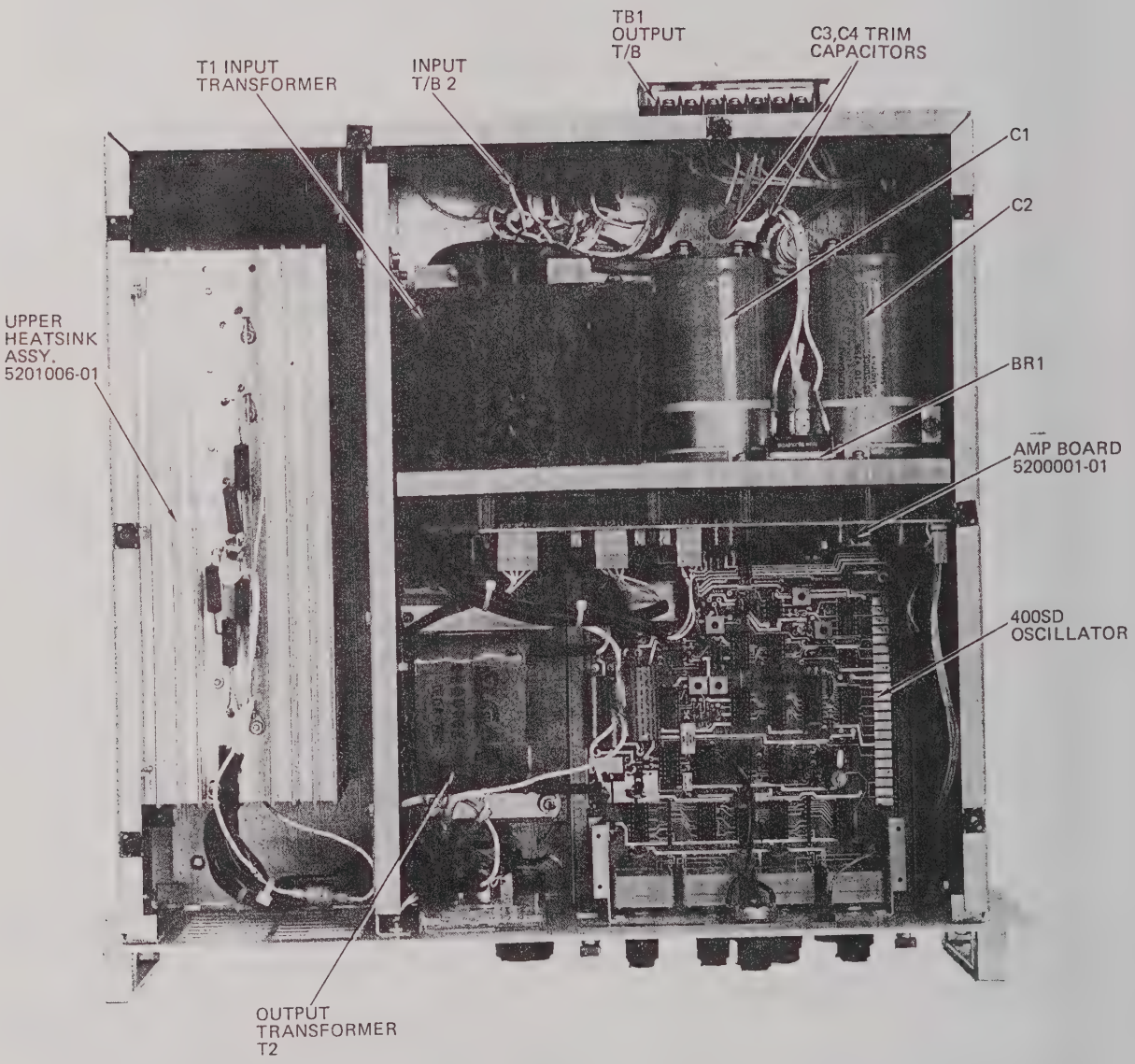


Figure 5-1. Model 251B Top View

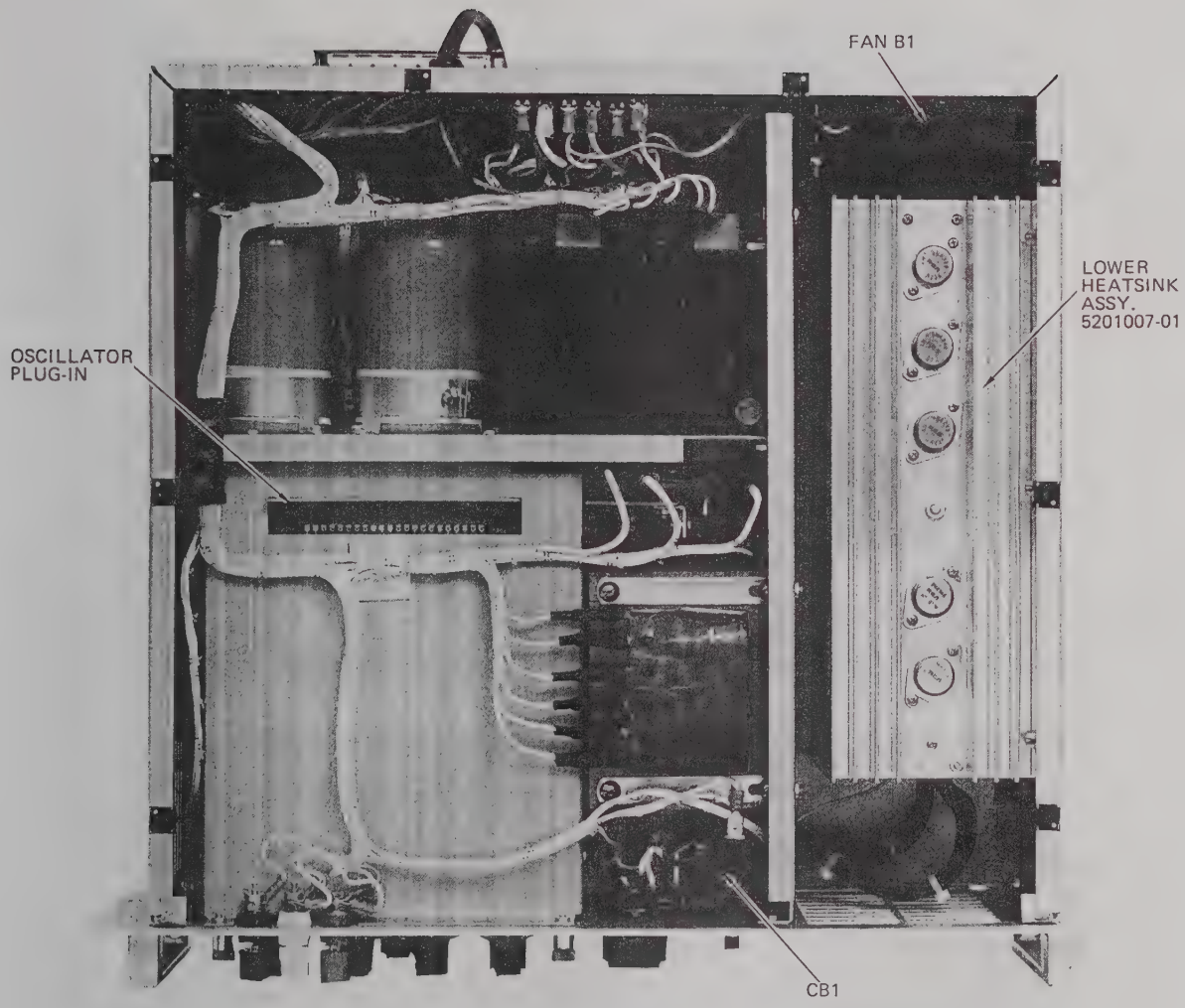


Figure 5-2. Model 251B Bottom View.

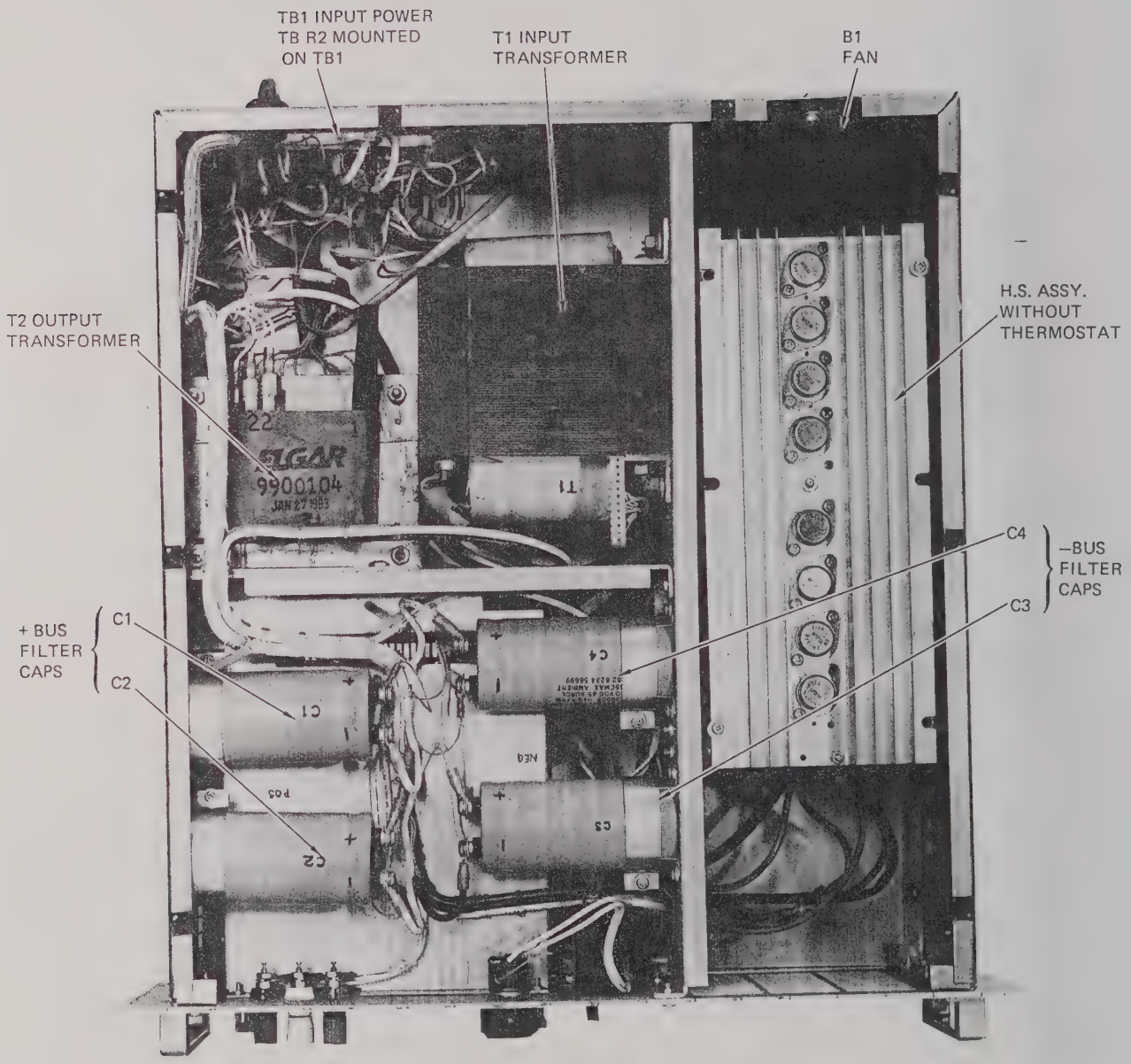


Figure 5-3. Model 501B Top View

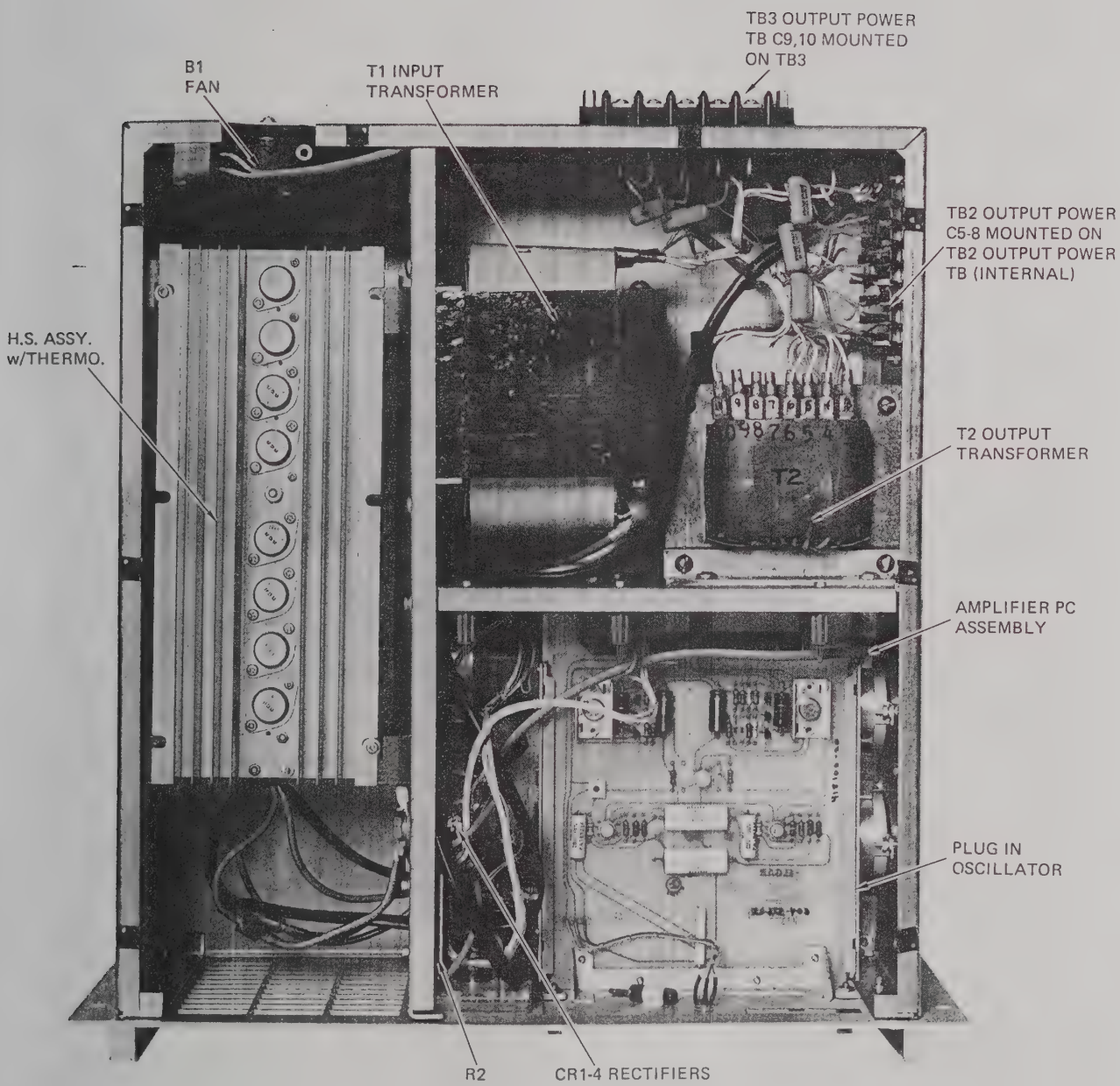


Figure 5-4. Model 501B Bottom View

SECTION VI
PARTS LIST

6.1 INTRODUCTION

6.2 This section contains a listing of repair parts for Model 251B and Model 501B. The reference designations listed correspond to the schematic designations on the diagrams in Section VII.

6.3 SPARE PARTS

6.4 When ordering spare parts, specify part name, part number, manufacturer, component value and rating, and the Elgar part number. If complete assemblies are desired, contact:

ELGAR CORPORATION
9250 Brown Deer Road
San Diego, California 92121

Specify assembly number, unit series number and unit model number when ordering.

251B CHASSIS ASSY. 5201001-01

SCHEMATIC DESIGNATION	VALUE	DESCRIPTION OR TYPE	RATING	MANUFACTURER		ELGAR PART NUMBER
				NAME	PART NUMBER	
B1		Fan	120VAC	Rotron	MU2A1	853-450-01
BR1		Bridge Rectifier	200PIV 27A	Motorola	MDA990-3	847-990-3X
C1,2	15,600uF	Capacitor	50VDC	GE	86F169M	826-153-11
C3,4	.015uF	Capacitor	1000VAC	Centralab	DDM153	821-153-10
J1/P1		Cable Assy.		Elgar	5201012-01	5201012-01
P5		Socket		Molex	09-50-3051	856-305-11
R1	4.7 ohm	Resistor	½W, 5%	Stackpole	RC20GF4R7J	802-4R7-05
T1		Transformer		Elgar	9900064-01	9900064-01
T2		Transformer		Elgar	9900065-01	9900065-01
TB1		Term Block	7 Pin	Cinch Jones	7-141	893-141-07
TB2		Term Block	6 Pin	Cinch Jones	6-141	893-601-6X
		Line Cord		Dayton	17419	890-174-19

251B FRONT PANEL ASSY. 5201002-01

SCHEMATIC DESIGNATION	VALUE	DESCRIPTION OR TYPE	RATING	MANUFACTURER		ELGAR PART NUMBER
				NAME	PART NUMBER	
		Binding Post	Black	Superior	BP30B	891-030-00
		Binding Post	Red	Superior	BP30R	891-030-02
		Binding Post	White	Superior	BP30WT	891-030-09
DS1		Lamp	120VAC	Eldema	BG01-RCS-A1C-68K	854-68K-22
M1		Meter	0-150VAC	Jewell	82T-150VAC	857-150-82
R1	10K	Resistor, Pot		Spectrol	534-9561-10	819-103-53

251B UPPER HEATSINK ASSY. 5201006-01

SCHEMATIC DESIGNATION	VALUE	DESCRIPTION OR TYPE	RATING	MANUFACTURER		ELGAR PART NUMBER
				NAME	PART NUMBER	
CR1		Diode		Motorola	MR2002S	845-368-DX
P4		Socket	4 Pin	Molex	09-50-3041	856-304-11
Q1-5		Transistor		RCA	2N4348	841-434-8X
R1-4	0.22 ohm	Resistor	5W, 5%	Dale	CW5-.22R	807-R22-05
R5	5.6 ohm	Resistor	5W, 5%	Dale	CW5-5.6R	807-5R6-05
R6,7	0.1 ohm	Resistor	10W, 5%	Dale	CW10-0.1R	808-0R1-05
S1		Thermostat		Elmwood	2450-21-272	861-340-0X

251B LOWER HEATSINK ASSY. 5201007-01

CR1		Diode		Motorola	MR2002S	845-368-DX
P3		Socket	3 Pin	Molex	09-50-3031	856-303-11
Q1-5		Transistor		RCA	2N4348	841-434-8X
R1-4	0.22 ohm	Resistor	5W, 5%	Dale	CW5-.22R	807-R22-05
R5	5.6 ohm	Resistor	5W, 5%	Dale	CW5-5.6R	807-5R6-05

501B CHASSIS ASSY. 5051002-01

SCHEMATIC DESIGNATION	VALUE	DESCRIPTION OR TYPE	RATING	MANUFACTURER		ELGAR PART NUMBER
				NAME	PART NUMBER	
B1		Fan	120VAC	Rotron	MR2B3	853-MA2-B4
		Binding Post	Black	Superior	BP30B	891-030-00
		Binding Post	Red	Superior	BP30R	891-030-02
		Binding Post	White	Superior	BP30WT	801-030-09
C1-4	9,000uF	Capacitor	50VDC	GE	86F168M1	826-908-12
C5-10	.05uF	Capacitor	600V	Sprague	6PS-S60	822-503-06
CB1	18A	Cir.Breaker	250VAC	Airpax	UPL1-1-6-1-183	852-183-32
CR1,4		Diode		Motorola	1N1186RA	845-118-6R
CR2,3		Diode		Motorola	1N1186A	845-118-6A
DS1		Lamp	120VAC	Eldema	BG02-RCS-A1C-68K	854-68K-22
J1/P1		Cable Assy		Elgar	5201012-01	520-1012-01
J6		Plug	4 Pin	Molex	03-06-1042	856-104-WT
M1		Meter	0-150VAC	Jewell	82T-150VAC	857-150-82
P5		Socket	5 Pin	Molex	09-50-3051	856-305-11
P6		Socket	4 Pin	Molex	03-06-2042	856-204-WT
R1	10K	Potentiometer		Spectrol	534-0561-10	819-103-53
R2	.05 ohm	Resistor	50W,5%	Dale	RH50-.05ohm	810-R05-05
R3	4.7 ohm	Resistor	½W, 5%	Stackpole	RC20GF4R7J	802-4R7-05
T1		Transformer		Elgar	9900103-01	9900103-01
T2		Transformer		Elgar	9900104-01	9900104-01
TB1		Term Block	6 Pin	Kulka	601-6	893-601-6X
TB2		Term Block	8 Pin	Cinch	8-141	893-141-08
TB3		Term Block	5 Pin	Cinch	5-150	893-150-05

501B HEATSINK ASSY. w/o THERMOSTAT 5051008-01

SCHEMATIC DESIGNATION	VALUE	DESCRIPTION OR TYPE	RATING	MANUFACTURER		ELGAR PART NUMBER
				NAME	PART NUMBER	
C1	.022uF	Capacitor	200V,10%	Sprague	192P22392	822-223-05
CR1		Diode		Motorola	Mr2002S	845-368-DX
P3		Socket	3 Pin	Molex	09-50-3041	856-304-11
Q1-8		Transistor		RCA	2N4348	841-434-8X
R1	5.6 ohm	Resistor	5W, 5%	Dale	CW5-5.6R	807-5R6-05
R2-8	0.22 ohm	Resistor	5W, 5%	Dale	CW5-.22R	807-R22-05
R9	22 ohm	Resistor	½W, 5%	Stackpole	RC20GF220J	802-220-05

501B HEATSINK ASSY. w/Thermostat 5051007-01

C1	.022uF	Capacitor	200V,10%	Sprague	192P22392	822-223-05
CR1		Diode		Motorola	MR2002S	845-368-DX
P4		Socket	4 Pin	Molex	09-50-3041	856-304-11
Q1-8		Transistor		RCA	2N4348	841-434-8X
R1	5.6 ohm	Resistor	5W,5%	Dale	CW5-5.6R	807-5R6-05
R2-8	0.22 ohm	Resistor	5W,5%	Dale	CW5-.22R	807-R22-05
R9	22 ohm	Resistor	½W, 5%	Stackpole	RC20GF220J	802-220-05
TK1		Thermostat		Elmwood	2450-21-272	861-340-0X

PC ASSY- AMPLIFIER

SCHEMATIC DESIGNATION	VALUE	DESCRIPTION OR TYPE	RATING	MANUFACTURER		ELGAR PART NUMBER
				NAME	PART NUMBER	
C1	10uF	Capacitor	50V	IMB	JA2A106K	822-106-10
C2,8	220pF	Capacitor	500V 5%	Sprague	CM05FD221J03	820-221-05
C3	.022	Capacitor	200V	Sprague	192P22392	822-223-05
C4	120pF	Capacitor	500V 5%	Sprague	CM05FD121J03	820-121-05
C5	.0082uF	Capacitor	200V 10%	Sprague	192P82292	822-822-05
C6	220uF	Capacitor	10V	Sprague	196D227X0010MA3	823-227-61
C7	.0015uF	Capacitor	600V 10%	Centralab	CF 153	821-152-00
C9	50uF	Capacitor	50V	Sprague	500D506G050DD7	824-506-71
C10	.0033uF	Capacitor	600V 10%	Centralab	CE 332	821-332-00
C11,12,13	.02uF	Capacitor	105V	Centralab	DDM203	821-203-00
CR1		Diode			IN5242	843-524-2X
CR2-9		Diode			IN4004	845-400-4X
J1		Connector Friction Lock	12 pin	Molex	09-72-1121	856-112-12
J2		Connector Friction Lock	6 pin	Molex	09-72-1061	856-106-11
J3		Connector Friction Lock	3 pin	Molex	09-50-3031	856-303-11
J4		Connector Friction Lock	4 pin	Molex	09-72-1041	856-104-11
J5		Connector	5 pin	Molex	09-72-1051	856-105-11
L1	150uH	Choke		Nytronics		851-150-01
Q1		Transistor			2N3810	849-381-0X
Q2,5		Transistor			2N3440	837-344-0X
Q3		Transistor			2N3567	835-356-7X
Q4		Transistor			2N3638	834-363-8X
Q6		Transistor			2N4236	836-423-6X
T1		Transformer		Elgar	990-191-91	990-191-91
TP1,2,3		Terminal		USECO	2035C	895-203-5C

PC ASSY - AMPLIFIER (Continued)

SCHEMATIC DESIGNATION	VALUE	DESCRIPTION OR TYPE	RATING	MANUFACTURER		ELGAR PART NUMBER
				NAME	PART NUMBER	
R1	3.9K	Resistor	½W, 5%			802-392-05
R2,6,12,13	4.7K	Resistor	½W, 5%			802-472-05
R3,15	5.11K	Resistor	1/8W 1%			813-511-1F
R4*	120ohm	Resistor	½W, 5%			802-121-05
R5	1.5K	Resistor	½W, 5%			802-152-05
R7*	6.8K	Resistor	½W, 5%			802-682-05
R8	2.61K	Resistor	1/8W, 1%			813-261-1F
R9	1K	Potentiometer		Spectrol	70Y102	819-102-30
R10,18,22	68ohm	Resistor	½W, 5%			802-680-05
R11	475ohm	Resistor	1/8W, 1%			813-475-0F
R14*	43ohm	Resistor	½W, 5%			802-430-05
R16,20,26,27	100ohm	Resistor	½W, 5%			802-101-05
R17	200ohm	Resistor	½W, 5%			802-201-05
R19	6.2K	Resistor	½W, 5%			802-622-05
R21	5.6K	Resistor	½W, 5%			802-562-05
R23	15ohm	Resistor	½W, 5%			802-150-05
R24,25	10ohm	Potentiometer		Spectrol	70Y100	819-100-30
R28,29	4.7K	Resistor	2W, 5%			804-472-05

* Factory Select

SECTION VII
DIAGRAMS

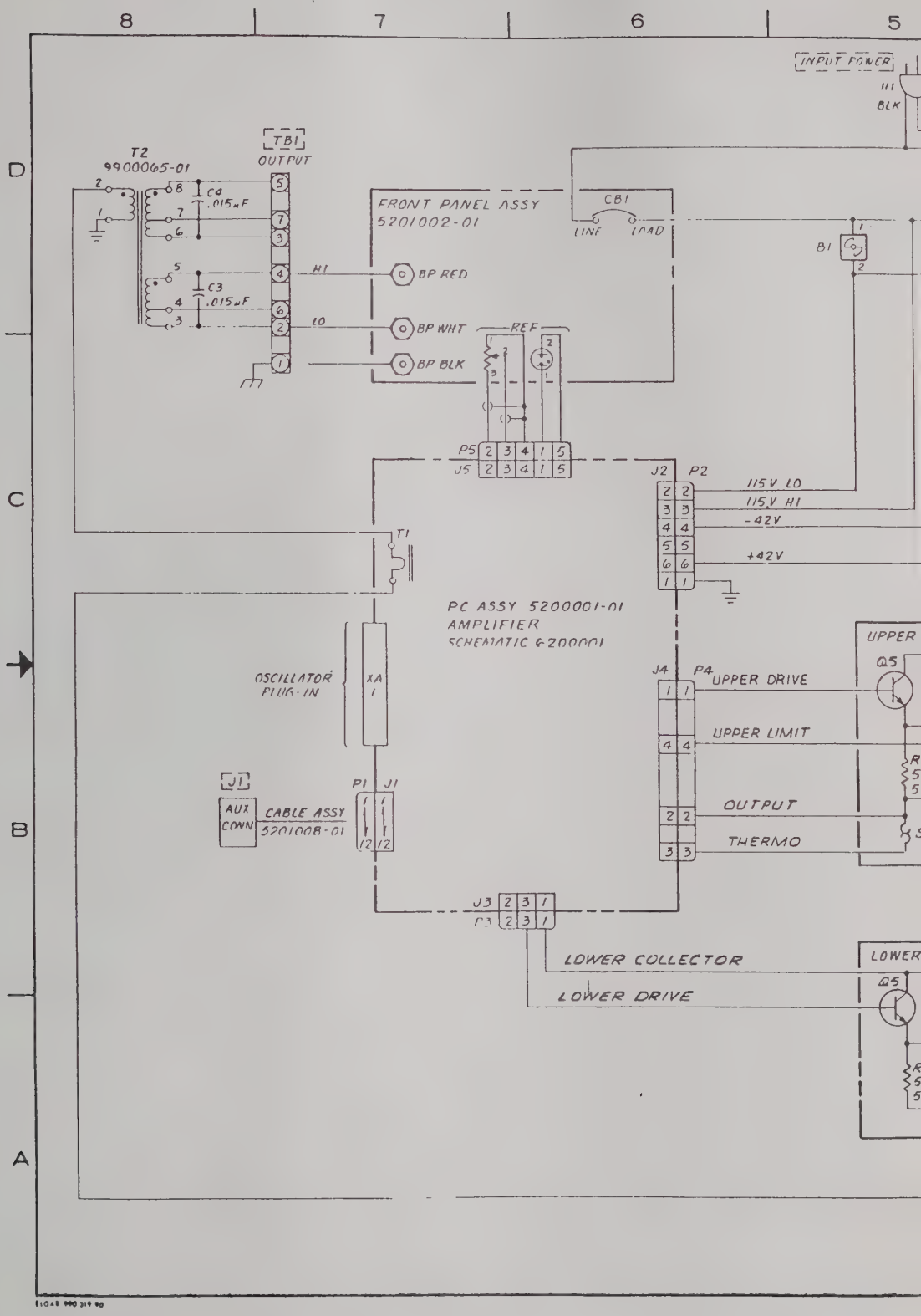
7.1 INTRODUCTION

7.2 This section contains schematic diagrams and assembly parts layout diagrams for Model 251B and Model 501B. The schematic diagrams should be used to understand the theory of operation as an aid in troubleshooting the unit. Reference designators shown on schematic diagrams correspond to the reference designators listed in the parts list where exact component values are given.

7.3 DIAGRAMS

7.4 The diagrams included in this section are as follows:

Figure 7-1 - Model 251B Interconnect Diagram
Drawing No. 6201000-01
Figure 7-2 - Model 251B/Model 501B Amplifier Schematic
Drawing No. 6200001
Figure 7-3 - Model 251B/Model 501B Amplifier Board
Assy 5200001-01 & -02
Figure 7-4 - Model 501B Interconnect Diagram
Drawing No. 6051001-01


8
7
6
5
D
C
B
A
INPUT POWER
H1
BLK
T2
9900065-01
TB1
OUTPUT
C4
.015 µF
C3
.015 µF
H1
LO
BP RED
BP WHT
BP BLK
FRONT PANEL ASSY
5201002-01
CB1
LINE
LOAD
B1
REF
P5
J5
J2
P2
115V LO
115V HI
-42V
+42V
T1
PC ASSY 5200001-01
AMPLIFIER
SCHEMATIC 6-200001
OSCILLATOR
PLUG-IN
XA
J1
AUX
CONN
CABLE ASSY
5201008-01
P1
J4
P4
UPPER DRIVE
UPPER LIMIT
OUTPUT
THERMO
J3
P3
LOWER COLLECTOR
LOWER DRIVE
Q5
UPPER
LOWER

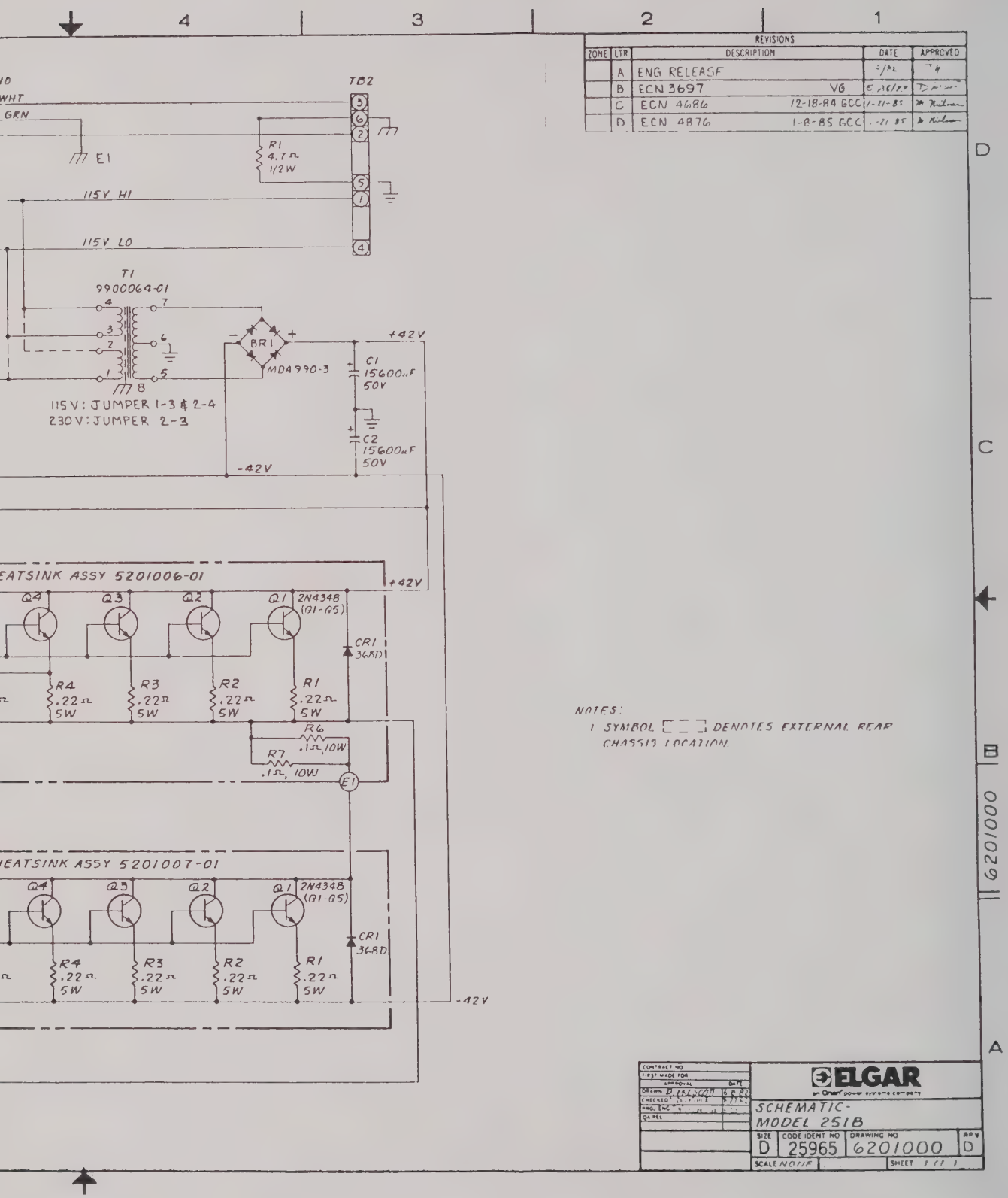
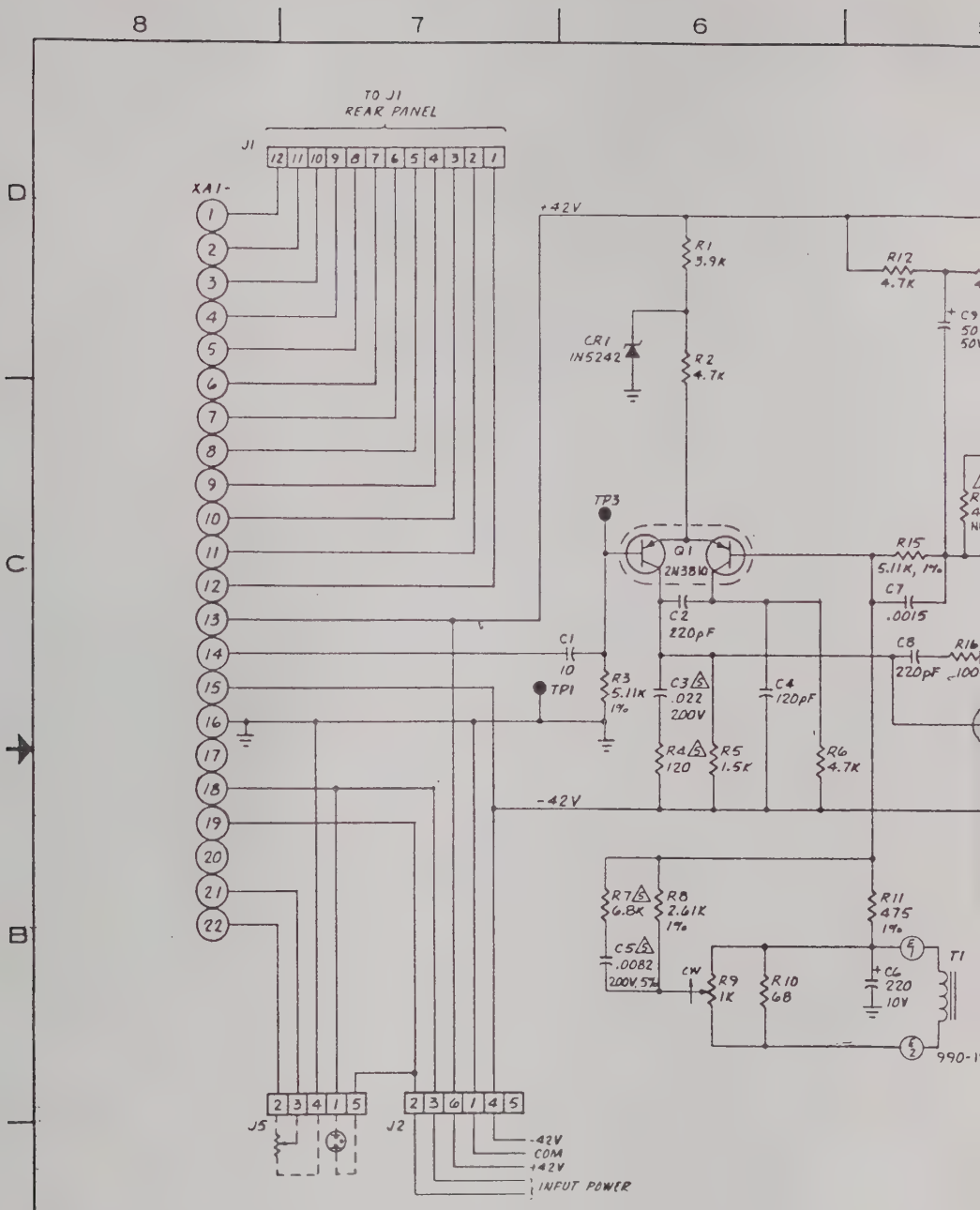


Figure 7-1. Model 251B Interconnect Diagram, No. 6201000-01



NOTES: UNLESS OTHERWISE SPECIFIED

1. RESISTOR VALUES ARE IN OHMS.
2. RESISTORS ARE 1/2 W, 5%.
3. CAPACITANCE IS IN MICROFARADS.
4. UNMARKED DIODES ARE IN4004.
5. FACTORY SELECT COMPONENT.
6. LAST USED REFERENCE DESIGNATOR: C13, CR9, J5, L1, Q6, R29, T1, TP3, XA1.

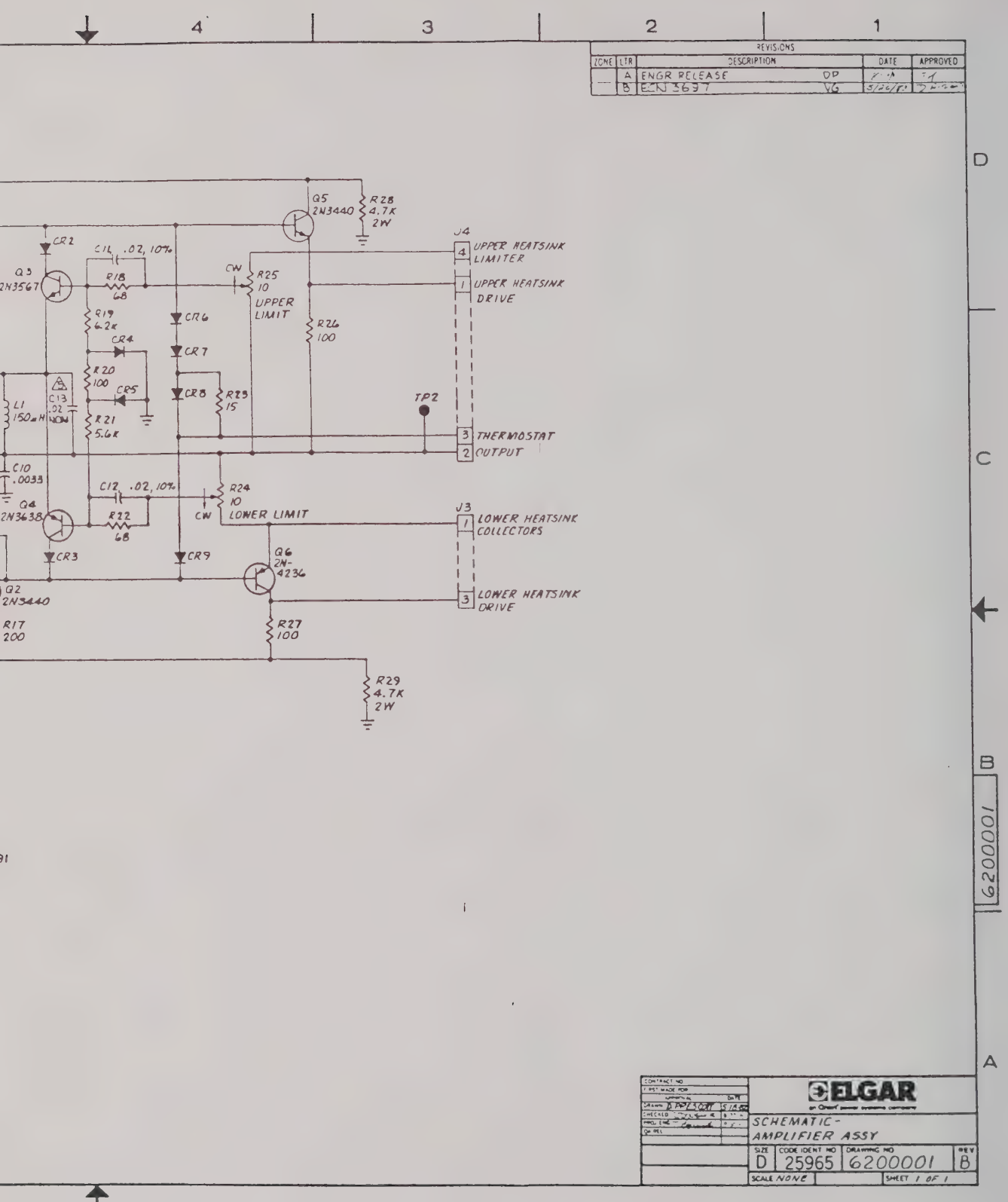
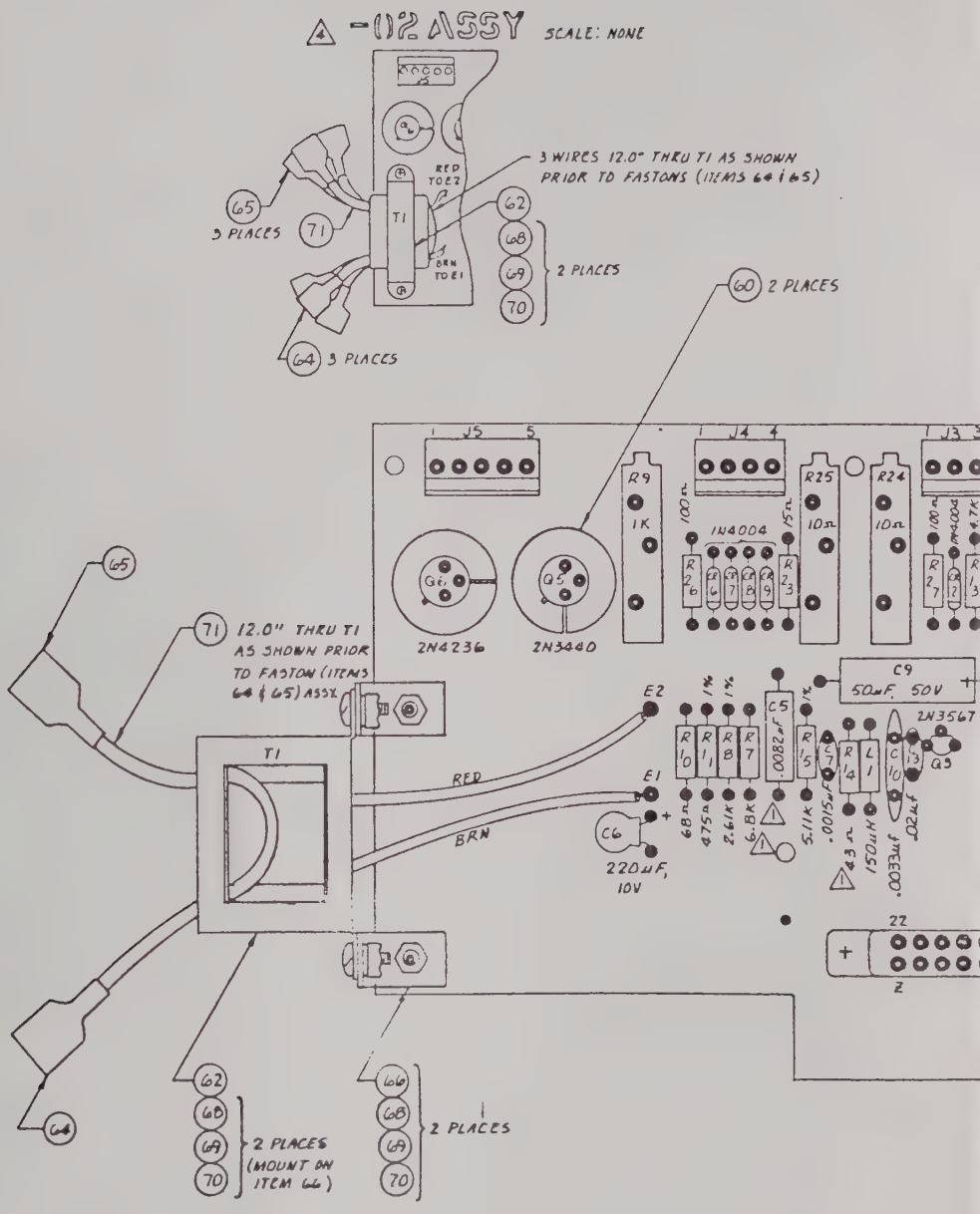


Figure 7-2. Model 251B/501B Amplifier Board, Schematic 6200001



NOTES: UNLESS OTHERWISE SPECIFIED

△1 FACTORY SELECT COMPONENT

2. FOR SCHEMATIC SEE DWG 620001.

△3 MOUNT R28 & R29 APPROX .25 ABOVE PCB.

△4 -02 ASSY- INSTALL T1 DIRECTLY TO PCB & WIRE AS NOTED.

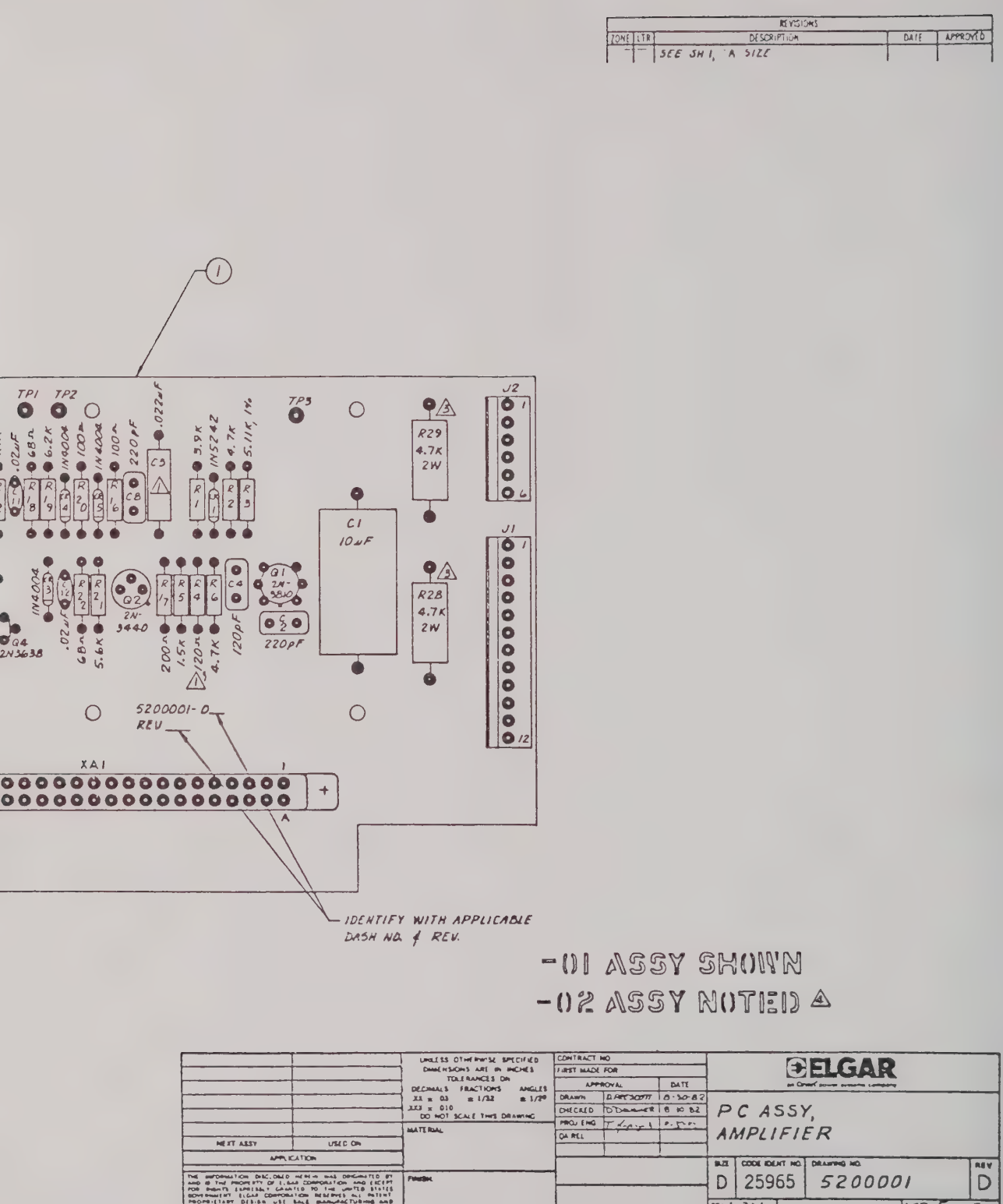
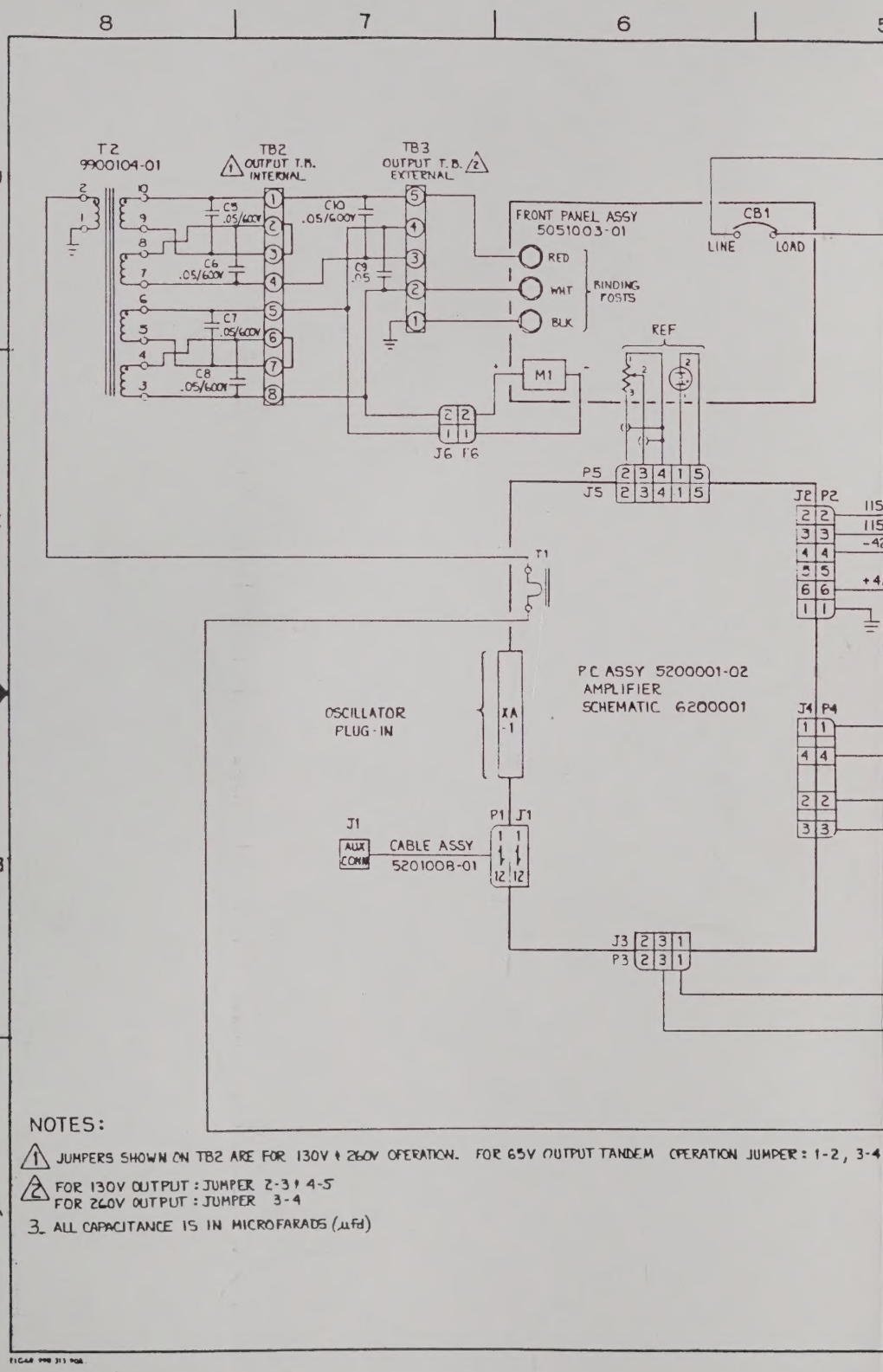


Figure 7-3. Model 251B/Model 501B Amplifier Board, Assembly Dwg. 520000-01, -02


8
7
6
D
C
B
A
T2
9900104-01
TB2
OUTPUT T.B.
INTERNAL
TB3
OUTPUT T.B.
EXTERNAL
C5
.05/600V
C6
.05/600V
C7
.05/600V
C8
.05/600V
C10
.05/600V
C9
.05
FRONT PANEL ASSY
5051003-01
RED
WHT
BLK
BINDING POSTS
CB1
LINE
LOAD
REF
M1
J6 P6
P5
J5
T1
OSCILLATOR
PLUG-IN
XA
-1
P.C. ASSY 5200001-02
AMPLIFIER
SCHEMATIC 6200001
J1
AUX CONN
CABLE ASSY
5201008-01
P1
J1
J3
P3
J2
P2
J4
P4
NOTES:
1. JUMPERS SHOWN ON TB2 ARE FOR 130V & 260V OPERATION. FOR 65V OUTPUT TANDEM OPERATION JUMPER: 1-2, 3-4
2. FOR 130V OUTPUT: JUMPER 2-3 & 4-5
FOR 260V OUTPUT: JUMPER 3-4
3. ALL CAPACITANCE IS IN MICROFARADS (μfd)

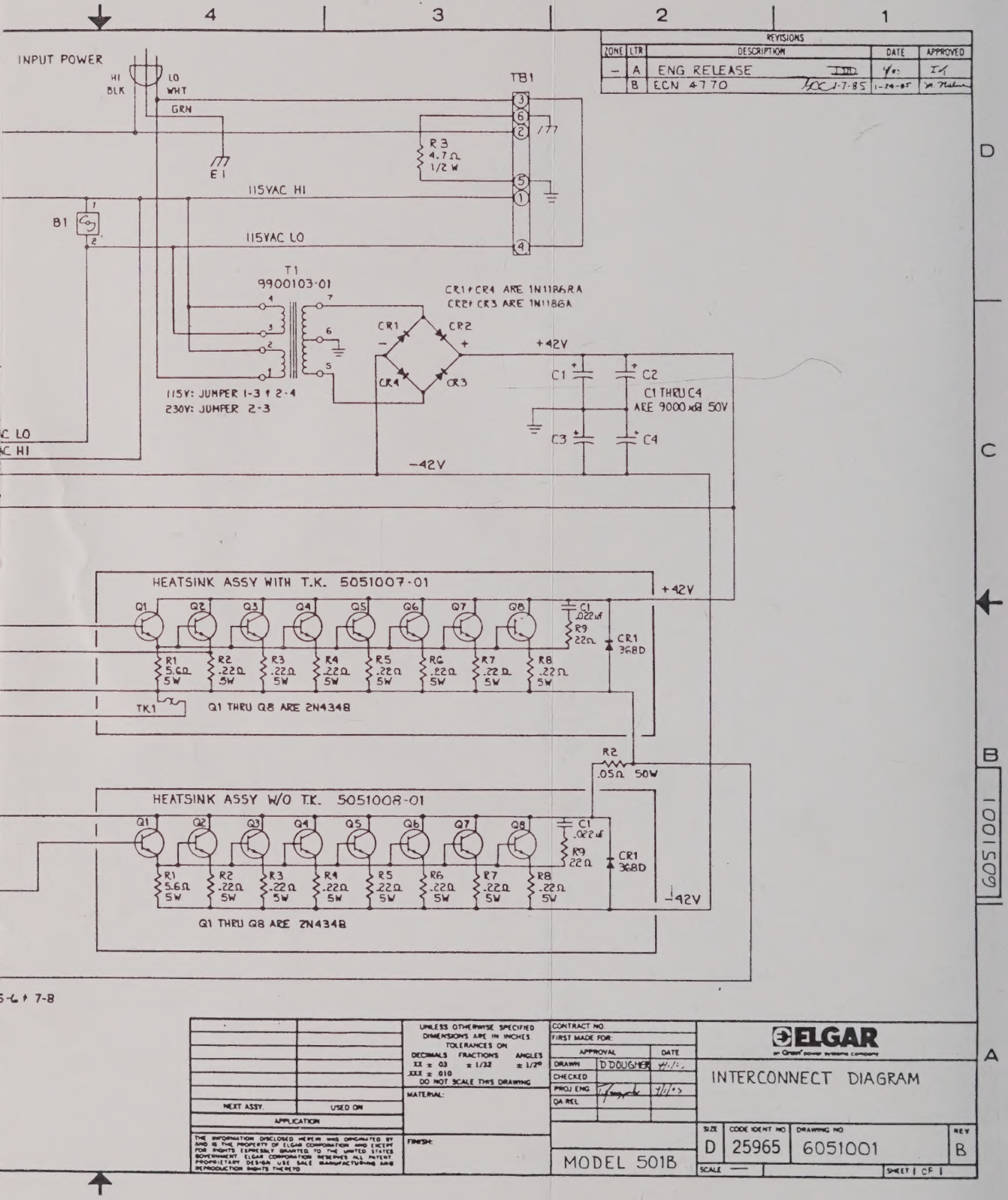


Figure 7-4. Model 501B Interconnect Diagram, 6051001-01

MP MASTER
MA23053